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EAST EUROPE REPORT

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SCIENCE AND TECHNOLOGY

HUNGARY

ECONOMY INTERNATIONAL AFFAIRS

GDR COMBINES PROVIDE MACHINE TOOL EXPORTS FOR USSR INDUSTRY

East Berlin PRESSE-INFORMATIONEN in German No 99, 27 Aug 85 (supplement) pp I, II

[Unattributed report: "Close Cooperation between GDR Engineering Industry and Soviet Partners"]

[Text] In the further formation of the developed socialist society in the GDR it is of fundamental importance to strengthen the comradeship, the ever closer cooperation with the USSR. As Comrade Erich Honecker pointed out at the 10th meeting of the Central Committee of the SED, the countries of the Socialist community "have to solve tasks which have far-reaching implications for the fate of mankind." In this context, strengthening the material bases of the policy of the KPdSU [Communist Party of the Soviet Union] and the SED [Socialist Unity Party] aimed at the welfare of the people and at safeguarding peace by means of progressing faster in the intensification of the national economies and in all areas of socialist economic integration has become a critical issue.

With the long-term program of cooperation in science, technology, and production between the GDR and the USSR until the year 2000 a stage of our cooperation was started which is new in terms of quality. The measures for a consistent implementation of this pathbreaking document which have now been determined and carried out are in agreement with the economic consultation of the Comecon member countries at the highest level. They are a firm part of preparations for the XI. SED Party Congress.

When it comes to the task of permanently guaranteeing the high dynamics of our economic development by extensive intensification, indeed by goal-oriented acceleration, the branches of the engineering industry together with electronic engineering and electronics function as pacesetters. They carry a particularly great responsibility in the solution of basic problems of the development of the productive forces, in particular with regard to scientific-technical top performances for the application of new key technologies and the fastest possible economic utilization of the most advanced new insights from science and technology. Solving the related requirements is of essential significance for increasing the performance of the national economy as a whole, for improving further the supply of the population and for strengthening the export capability of our republic.

Based on this premise and by order of the party and government leadership of both countries the Joint Government Commission GDR/USSR pays particular attention to the consultation and determination of further steps for an ever closer and more profitable cooperation in the area of mechanical engineering and electrical engineering/electronics. Of the more than 200 agreements with the USSR currently in existence almost half relate to these industries. In this area, division of labor and cooperation have advanced particularly far. Almost 50 percent of the products to be supplied by the GDR to the USSR are based on specialization agreements. If we look at GDR export to the Soviet Union as a whole, the metal-processing industry and electrical engineering/electronics have a share of approximately two thirds and are thus in first place by a wide margin. This emphasizes the high priority of mechanical engineering and electrical engineering/electronics within the framework of interweaving the economies. It is our task to jointly continue to strengthen and render more effectively this cooperation for the good of our brother countries and for the strengthening of peace.

Focus on Future-Oriented Technologies

Future-oriented technologies, the basis for modernization and intensification of many industrial areas, become more and more the center of the cooperation between both countries. The fact that the GDR today counts among the few industrial countries which produce state-of-the-art technological equipment for the production of microeletronic components and selected types of circuits is the result particularly of the close cooperation with the Soviet Union. Based on joint research the key elements in the field of microelectronics are the development of modern basic technologies, technologies of new components and microprocessors as well as the production of special equipment and materials for microelectronics.

The cooperation of the industrial branch of electrical engineering/electronics with partners in the USSR which is constantly being strengthened and which is based on a division of labor is also reflected in the exchange of goods which increases every year and in the continuously rising share of specialized products. At present, these amount to more than half of total exports of this industry to the Soviet Union. For instance, the combine Robotron - which has this industry's largest export share to the USSR - will deliver the 500th type ES 1055 computer to the Soviet Union this year. The GDR will receive the 225th type ES 1035 computer from the USSR. Both computers belong to ESER, a uniform system of electronic computing technology of the Comecon countries.

Cooperation in Research and Development

All other combines of the industrial sector of electrical engineering/electronics are also included in this mutually beneficial cooperation which reaches from cooperation in science and technology to the coordinated production based on a division of labor. For instance, approximately one out of 10 locomotives produced so far in the locomotive-electrotechnical plant combine VEB "Hans Beimler" was delivered to the USSR.

The most recent example of the fruitful cooperation is the development of a new generation of industrial locomotive groups for opening up ore deposits in the Soviet Union.

The combine VEB Carl Zeiss JENA closely cooperates with Soviet partners in many fields. Thus, a considerable concentration of research and development capacities and thus a considerably faster utilization of new scientific-technical insights is possible. The most outstanding results of this partnership include the equipment complexes for remote exploration of the earth--from the multispectral camera MKF 6 to the complicated evaluation and reproduction technology for special photos--which are of great importance for the further exploration of raw material deposits.

There is also a traditionally close cooperation between the cable industries of the GDR and the USSR. Based on the large scientific-technical potential of the Soviet partners and the increasing performances of the cable plant combine VEB Oberspree "Wilhelm Pieck" a stable cooperation has developed both in research and in production. Results of this cooperation based on a division of labor include the production of unsupported high-voltage and telecommunications cables, but also new expertise for the use of cold-resistant and super-conductive cables. A particular focus is placed on the development of new conductor systems, for instance, optical fiber cables. Deliveries from the cable plant Oberspree are intended for, among others, the pulp combine Ust Ilimsk, the mining and processing combine Kijembai or the crude oil area Tjumen.

Joint Lead Research

The numerous specialization and cooperation agreements with Soviet partners form an essential basis for the dynamic growth of heavy machine and plant construction in the GDR. For instance, both countries are already now concentrating the capabilities of lead research on finding out which technologies and equipment will determine the level of ship building after 1990. For seagoing and inland vessels as well as the fishing industry in the USSR, the GDR and other countries are using the insights of this scientific-technical cooperation. The specialization which was agreed upon makes it possible for GDR ship-building to effectively produce large series, for instance freighters up to a capacity of 30,000 tdw, container ships and fishing boats, sea and chain-and-bucket excavators, inland freight and inland passenger ships. In addition to the technical development of ship models and the technology of their production the joint research program also includes tasks for standardizing equipment, systems and plants depending on their particular area of application. This coordinated, scientific-technical work resulted, for instance, in the new refrigerated trawler seiner boats or the Lo/Ro and trailer models of roll-on/roll-off vessels.

Specific Conditions Taken into Account

The Soviet railroad, the world's largest railroad organization, operates 35,000 long-distance passenger coaches and 33,000 refrigerated coaches. They are proving their value under extreme climate conditions, e.g. in temperature fluctuations ranging from -50 degrees Celsius to +50 degree Celsius. The

experience gained in the production and use of the rail cars form the basis for the joint deelopment of a new long-distance car which will feature above all more space, lower dead weight and improved fire protection.

There is also close cooperation with Soviet users in the area of heavy machinery construction. Designers and technicians of the VEB heavy machinery construction plant Lauchhammer, for instance, clarified all questions with Soviet specialistis which were related to the development, design, manufacture, assembly as well as the use of high-performance bucket-wheel excavators in the Northern bituminous coal strip mining operation Ekibastus. The difficult geologic and climatic conditions required a thorough examination and comprehensive testing of the excavators. The experience gained in this process resulted in a premium product, which is characterized by a favorable mass-performance ratio and is well suited for the requirements of the specific application.

Machine Tools - Basis for Productivity

Every other machine tool from our country goes to the Soviet Union as our main customer. Machine tools account for approximately ten percent of the total export of the GDR to the USSR; they are intended for use in the Soviet car, roller bearing and electrical motor industry as well as for the production of consumer goods. Until 1990 GDR-combines will, for instance, delivery nine flexible machine systems as well as 158 flexible production sections for the machining of prismatic and dynamically balanced parts.

A main concern of the cooperation is the development of complex solutions and technologies for streamlining production. For instance, an expert collective from the main plant of the VEB Machine Tool Combine "Fritz Heckert" is building the machine system 1000 for the Soviet car industry. This machine system is centrally controlled by microprocessors and consists of 19 interlinked centers for drilling and milling. The Association for Heavy Machine Tools Iwanowo will receive a heavy horizontal boring machine and a machine for longitudinal machining from the same combine. There are also good results in the coordinated development of step forming automatic machines, automatic press complexes, grinding tools or super-hard tool materials.

Equipment and Engineering Services

Machines with the sign of our Republic are an everyday sight in Soviet printing shops, but also in the textile industry. Thus, newspapers and magazines with a circulation of millions--for instance "Pravda", Moskowskaja Prawda", Ogonjok", "Smena" or "Krokodil"--are printed on equipment from the polygraph "Werner Lamberz" Leipzig. Development, production and delivery of the equipment for the graphics industry of the total Comecon area is done jointly with the USSR. A key area of the scientific-technical cooperation of both countries in this field is the use of power electronics as well as the increased application of control systems with microprocessors.

Among the socialist countries the combine Textima is a main producer of spinning machines, flat knitting machines, warp knitting looms and industrial sewing machines, laundries and dry cleaners, as well as the sole producer of

double carpet weaving machines, flat weft knitting machines as well as Liropol and Liroflor machines. In addition to deliveries of machinery the export treaties with the USSR also include engineering services, for instance, projects, documentations, samples for the organizational-technical equipment.

Large Quantities Possible Due to Coordinated Production

Agricultural machines are an important part of the mutual deliveries between the GDR and the USSR. For instance, the Soviet Union received more than 60,000 self-drive pick-up choppers and swath forming mowers as well as 40,000 potato harvesting machines from the plants of the VEB combine FORTSCHRITT. By providing modern and efficient agricultural and food machines from the area of the Ministry for the Construction of General Machinery, Agricultural Machinery and Vehicles the GDR contributes to the retooling, modernization and reconstruction of plants of the food industry for implementing the food program in the Soviet Union.

The scientific-technical cooperation of both countries in this field resulted, for instance, in types of loading beet lifters and pipeline milking plants, fine seed lines, milk cooling vats as well as a technical line for the production of sterilized drinking milk. By concentrating the available capacities the development time was shortened; a coordinated production ensures production in the amounts required. In this context, the direct contact between partner plants with a similar product line proved valuable. The agricultural implements VEB Leipzig and the combine plant Ternopol, for instance, closely cooperated in the production of beet harvesting machines, from the development of the product, through redesign measures to mutual deliveries of tools, devices and means for increasing efficiency.

Mutually Beneficial Exchange of Experience

Performance comparisons between producers of analogous products are an essential part of direct cooperation. These include, for instance, the tractor plant Schoenebeck as a manufacturer of pick-up choppers and the Soviet agricultural machinery factory Gomel, for swath forming mowers the harvesting machine VEB Neustadt/Sachsen and the partner plant in Ljuberzy as well as the refrigerator producers in the dKK Scharfenstein and in Minsk. The concrete, practice-related exchange of experience gained with previous achievements offers the opportunity of rapidly implementing effective methods in the industrial enterprises of both countries.

The Soviet modern methods used in our republic include, for instance, the hot-rolling of chain wheels for potato harvesting machines, the application of automatic machines for crankshaft bending for the production of overloaders in combines as well as build-up welding for digging wheels of the beet harvesting combine KS-6. This improves primarily materials economy and quality.

Life and surface quality of machined parts are increased if they have been polished with synthetic diamonds. This new technical method from the USSR is used by the agricultural machinery plant VEB Halberstad, for instance, for the production of subassemblies for potato harvesting machines; in doing so, it was able to increase work productivity to 167%. In other areas of industry,

too, the scientific-technical cooperation as well as specialization and cooperation between the GDR and USSR is continued according to plan, including medical technology and vehicle construction.

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CSO: 2300/256

ECONOMY

CZECHOSLOVAKIA

CENTRAL TRADE UNION COUNCIL PRESIDIUM MEETS

AU261440 Prague RUDE PRAVO in Czech 11 Mar 86 p 2

[CTK Report]

[Text] Prague (CTK)--The Presidium of the Central Trade Union Council held a session in Prague on Monday [10 March]. It discussed detailed instructions for the 5-year plan of personal and social development for the 1986-90 period and for the annual execution plans, and approved the Central Trade Union Council's guidelines on the tasks of the Revolutionary Trade Union Movement [ROH] agencies for compiling, fulfilling, and supervising plans of personal and social development in the Eighth 5-Year Plan. In the course of the plans' preparation, issues concerning the more effective solution of safety, hygiene, and health-related requirements in the work environment, and concerning expanding the scope for the working people's participation in their preparation, fulfillment, and supervision were assessed in broader contexts.

The Central Trade Union Council Presidium also approved the draft outline for the orientation, for the organization of the schooling of functionaries, and for the political and economic indoctrination of ROH members in the 1986-90 school year.

The Presidium also received a draft amendment of the election rules for elections in primary organizations and higher level trade union agencies. A draft plan for ROH's selective recreation at home and abroad and for the allocation of vouchers [for recreation] in 1987 was also approved.

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ECONOMY

CZECHOSLOVAKIA

BRIEFS

SOVIET DELEGATION VISITS SKODA PLANT--The Soviet delegation headed by Ivan Silayev, deputy chairman of the USSR Council of Ministers and chairman of the Council of Ministers' Bureau for Engineering, today visited the Skoda concern in Plzen. The Soviet guests were told about the problems in nuclear reactor production, and progress in mastering work on VVER 1000 reactors. The general manager of the Skoda concern stressed that the Skoda workers were able to master this highly demanding technology only with the help of the Soviet Union, and that last night's official delivery of the second block of the nuclear power block to Dukovany had been carried out in close cooperation with Soviet specialists. [Text] [Prague Domestic Service in Czech 1300 GMT 21 Mar 86 LD] /9274

CSO: 2400/237

DEFICIENCY, IMBALANCE IN CONSUMER GOODS INDUSTRY EXAMINED

West Berlin DIW WOCHENBERICHT in German Vol 53 No 6, 6 Feb 86 pp 79-82

[Article: "Consumer Goods Production in the GDR's Basic and Production Equipment Industries"]

[Text] A report by the State Statistics Office on the Fulfillment of the 1985 Economic Plan once again emphasizes the achievements of production equipment plants in their supplementary production of consumer goods. What is behind this?

Demand for supplementary production of consumer goods in the basic and production equipment industries is nothing new.[1] It was already expressed in the early 1970's (VIIIth Party Conference) and repeated at the IXth and Xth Party Conferences (May 1976 and April 1981, respectively): "The production of consumer goods is the responsibility of the economy as a whole. It is required even in those locations where the primary product is production equipment." However, these appeals apparently found only hesitant compliance in the 1970's. The campaign appears to have been reopened as of the Seventh Meeting of the SED's Central Committee (November 1983); on that occasion the Politburo made decisions for the production equipment plants and cited several specific plants for their respective production records. In addition, it issued a general guideline: until 1985, 5 percent of the production of production equipment plans was to be devoted to consumer goods. Since that time, the ministries of the industries concerned have been making more frequent reports about new products in their plants. In the meantime, some plants have not only organized special departments for consumer goods production; in some cases entire enterprises have been reorganized. Also, workers are frequently employed in consumer goods production whose jobs had been eliminated in other areas as economy measures.

Changes in Demand

The GDR also cites as a reason for this campaign certain changes in consumption configuration[2] based on a higher living standard.

Consumption increases have slowed down for shoes, clothing, hosiery and underwear; these product groups have a smaller share of mass produced goods today than they did during the early 1970's. On the other hand, there is an increase

in demand for household appliances and for consumer goods connected with personal automation; there is greater demand for raw materials and building materials for home improvement and leisure time activities and for "modern" products, e.g., home entertainment electronics, body and health care, etc.

Inasmuch as capacities of the traditional consumer goods plants are inadequate for this, such production is to be transferred to the basic and production equipment industries. Examples published in the GDR press indicate the direction this is taking:

- production of the so-called 1,000 small items for daily use;

- leisure time items (sports, gardening, do-it-yourself tools);

- household items;

- electric and sound instruments and electric household appliances.

This production is primarily intended for the domestic market. It is remarkable that in 1984 about 40 percent of new and improved electric and sound products came from plants engaged in production equipment manufacture.

The Concept

Four methods have been decreed for supplementary production of consumer goods:[3]

1. Consumer goods are developed and produced which have manufacturing processes similar to those of the primary products.

Examples: The People's Enterprise First Machine Tool Factory Karl-Marx-Stadt, a plant of the Textima combine, which has the technological capabilities for industrial centrifuge production, produced home wash machines as early as the 1950's. The Textima combine also produces non-commercial sewing machines, ironing and knitting machines, and bicycles. The Air and Cooling Technology combine has production facilities and technologies permitting it to incorporate freezers in its manufacturing program. The same is true for various combine of the Heavy Machinery and Facilities Construction Ministry (e.g., boats in the ship building people's enterprise, cement mixers in the Baukema combine, exhaust systems and motor vehicle trailers in the TAKRAF heavy machinery construction combine), as well as do-it-yourself tools from the combines of the Ministry for Tool and Processing Machinery.

2. Contributions to consumer goods production are made into final market products within the combines themselves.

Example: Dresden's Electric Motor Manufacturing combine uses several of its electric motor types to power such products as hobbyists' power plants, lawn mowers and kitchen appliances (e.g., Multiboy, mixing machines).

3. Consumer goods production uses byproducts or production waste products occurring in primary or ancillary processes and which have until now been

salvaged to a limited degree or not at all. This is particularly true of the chemical industry, metallurgy and the energy and fuel industry. This should result in a greater degree of refining and raw materials conservation.

Example: the Leuna Works products plastic buckets; the shipbuilding combine furniture; the Berlin Rubber Works rubber rafts. Special mention is made of a new polyvinyl chloride floorcovering material from the Buna Chemical Works as an example of successful in-house research and development.

4. There are also some types of consumer goods which have no connection with manufacturing technology or the raw materials involved. This approach to supplying them is considered correct also to the extent that shortages exist which can be alleviated using economic production methods.

Examples: an electric shaver has been in production for 20 years in the Bergmann-Borsig People's Enterprise. A part of antenna production was transferred to the Werra potash plant.

Integration Into the Overall Economy

One prerequisite for a meaningful contribution by the combines which produce production machinery to satisfying requirements for consumer products, is their integration into the overall economy, if redundant or unsuccessful developments, dissipation of capacities or even overproduction are to be prevented. This is the reason why more effective planning and other rules are being elaborated.

One decree by the Council of Ministers of February 1982 provides that without the approval of the respective "balancing" combines[4], no new consumer product lines may be initiated by combines producing production machinery. This eventually became law and today constitutes a passage of the "Planning Order."[5]

The combine responsible for establishment of a balance is to assume the role of trendmaker and to supervise and direct consumer goods production in the industries governed by their respective districts as well as in production machinery manufacturing facilities, as to variety, technical specifications, etc.

Among the centrally managed combines having balancing functions for consumer goods are the following: the household goods combine (Karl-Marx-Stadt), Radio and TV (Strassfurt), Electric Appliances (Suhl), Electric Motor Works Friedrich Ebert (Berlin), Pentacon (Dresden), which has been a part of the Carl-Zeiss-Jena combine since 1 January 1985, and the Toll combine in Schmalkalden.

Production geared to demand is to be provided through close cooperation between combines and domestic trade. District councils have a consulting and coordinating function in this, through special consumer goods advisory offices in district planning commissions. Thus the consumer goods advisory office of the Frankfurt district coordinates a furniture component program which was jointly developed by furniture factories, the Beeskow chipboard plant and the Apartment and Public Building Combine in Frankfurt.

However, in actual practice these regulations are not yet very effective, as can be gathered from articles in the GDR trade press:[6]

1. Despite the above mentioned responsibility of consumer goods combines as balancing authorities, there are difficulties in integrating production machinery combines into the existing balancing system. For this reason, a closer linkage with the overall planning process is thought to be desirable. Information from the consumer goods balancing process is to be used to better advantage in the overall planning; the statement is made that "this will indicate which particular present and future demand cannot be satisfied. Information of that type is to be communicated to the State Planning Commission."[7] This is to enable the State Planning Commission to develop a development concept for consumer goods jointly with the industry ministries and to provide guidance to the district consumer goods advisory offices. In addition, this should serve to improve cooperation among the industry ministries (e.g., within the metals processing industry), so as to arrive at effective coordination with respect to supplementary production. The work should always be concentrated within the appropriate industrial enterprise concerned.[8]

2. Coordination between the domestic trade facilities (central bulk warehouses) and the combines producing production machinery is still considered partly deficient. In the GDR economic system, domestic trade is intended to fulfill an additional function of controlling production, i.e., it is to alert the production component to "buying desire," or unsatisfied demand. Criticism is voiced over the fact that cooperation is mostly limited to short-term coordination and that there is a lack of long-term "strategic" collaboration (i.e., marketing surveys, development of assortment structures, new product development).

As useful as such coordination may be, it entails the danger that in actual practice complicated planning procedures would have a negative impact upon the originally intended flexibility and capability to react to consumer demands.

Evaluation

Supplementary production of consumer goods cannot be judged by standards applying to enterprises in market economic systems alone. It is true that in Western enterprises too, special manufacturing technologies and knowhow from the capital goods area are frequently adapted to the production of consumer goods (especially in the electronics industry). However, that type of production is frequently unprofitable. Lack of knowledge of market conditions and high marketing costs are a factor in this. These costs are of relatively lesser importance in the GDR. In the case of consumer goods for which there is a demand, it can be sold without fancy packing, advertising or customer service; distribution costs are lower also. Sales can be facilitated by selling the product initially only within the district of the combine itself through district-controlled sales facilities. In widespread distribution there are usually contractual agreements with central domestic trade warehouses, especially those for household goods, for equipment, for furniture/cultural merchandise/sporting goods).

The pnenomenon of supplementary production of consumer goods in GDR combines cannot be compared with that of diversification in Western enterprises, since in the former case there is no attempt to find a "second pillar" for purposes of spreading risk. Rather, it is an expression of attempts to use raw materials economically, but it frequently also indicates hidden unemployment--workers laid off in the combine as a result of economy measures are freed for new substantial employment within the existing organizational structure. Among the examples for this are the Mansfeld Combine, a copper mine, where workable reserves are gradually diminishing; some of the work force is being used in the manufacture of drilling machinery. In the Senftenberg Soft Coal Combine, personnel no longer required for mining is now engaged in making toys. In this manner the work force stays in its major employment sector and remains under the influence of the combine executives. Founding of new enterprises, while not impossible, would involve a multiplicity of organizational problems and would require the type of flexibility which is largely missing in the GDR.

In evaluating the above described GDR concepts, the first three procedures make some economic sense: making use of a related manufacturing technology, further processing of goods delivered or the use of waste products. There are however some rather grotesque examples of consumer goods which are not at all related to the production profile of the enterprise (e.g., car trailers produced by the "Black Pump" gas combine; baby food heaters from the Oberspree Cable works; folding chairs from the Numerik People's Enterprise in Karl-Marx-Stadt). In addition, the trade press contains many reports on achievements which really have nothing to do with supplementary production, but which are a traditional subordinate department of the combines or plants concerned (e.g., home sewing machines from the Wittenberge commercial sewing machine plant Wittenberge in the Textima combine) or an administrative merger of consumer goods producers with production machinery manufacturers (e.g., the Wittol People's Enterprise, which produces household chemicals, was attached to the Schwedt petrochemical combine).

A mandatory 5 percent quota for supplementary production is not much help either, since it entails the danger of producing "white elephants": barbecues, toasters, laundry racks--there might be overproduction for existing demand, or inadequate quality.

At present the economic leadership emphasizes matters different from those of the early 1980's:[9] warnings are issued against the practices of improvisation, rushing and shortsightedness, and the mandatory 5 percent quota has been partly abandoned. Greater importance is attributed to questions of efficiency and the following goals are being set:

- mass production, using modern manufacturing methods;

- the establishment of specialized plants for primary product lines, some with their own R&D capabilities;

- some in-house production departments and facilities to assist in "in-house creation of efficiency measures."

However, these calls for efficiency appear not to have been widely implemented. The Plan Fulfillment Report makes reference only to some exemplary combines with "trend setting products...which make it possible for high-quality goods to be manufactured economically in great quantities" (see table).

In summary: the initiatives make sense in those cases where actual shortages are eliminated while at the same time using various reserve capabilities. Pressure for economical use of raw materials may presently favor the acceptability of promoting supplementary production while losing some efficiency in the use of the work force. Besides, combines are reluctant to shift available workers to other combines.

Of the total GDR industrial production roughly one-sixth is devoted to consumer goods.[10] According to GDR press reports[11] combines producing production machinery produced 15 billion marks' worth of industrial consumer goods in 1984 and achieved a 17 percent share of the total consumer goods production in the centrally controlled industrial sector.

Thus in a quantitative sense the combines producing production machinery make a considerable contribution to the consumer goods volume. Unresolved is the question to what extent this represents merely a continuation of previously existing consumer goods lines, or whether new products are involved.

It is questionable as to whether or not these combines make an effective contribution to the qualitative alleviation of the availability of consumer goods. Mass-produced items and "solid standard quality" doubtlessly predominate, just as this is true for the traditional consumer goods industries; highly technical and creative innovations take longer. The need for materials conservation has further increased quality problems.

However, expansion and qualitative improvement of consumer goods production is mandatory for adequately supplying the population and for producing export surpluses in foreign trade. To achieve this, the capabilities of the traditional consumer goods combines must first be increased; production machinery combines can contribute to progress only to a limited degree.

Combines	Consumer Goods Produced
Schwedt Petrochemical Combine	Household aerosol sprays
Brandenburg High-Grade Steel Combine	Subcontractor for producing motor vehicle trailers
Senftenberg Soft Coal Combine	Toys and ironing boards
Erfurt Microelectronics Combine	30-liter hotwater tanks; pocket calculators
Hennigsdorf "Hans Beimler" Locomotive and Electrical Works Combine	80-liter hotwater tanks
Schmalkalden Tool Combine	Electric tools
Ludwigsfelde IFA Commercial Vehicle Combine	Passenger car trailers
Neustadt "Fortschritt" ["Progress"] Agricultural Machinery Combine	Garden tool systems

Source: Report by the State Statistics Office on the Fulfillment of the 1985 Economic Plan. In: NEUES DEUTSCHLAND, 18/19 January 1986 p 4

FOOTNOTES

1. From: Doris Cornelsen, Andreas Koch, Horst Lambrecht, Angela Scherzinger: The Supply of Consumer Goods in the GDR and Interaction with Inner-German Trade. In: BEITRAEGE ZUR STRUKTURFORSCHUNG DES DIW, No 87/1985.

2. From: Achim Dippe ("Karl Marx" Party Academy of the SED Central Committee), Hans Leger (Research Institute of the Ministry for Science and Technology): The Increased Contribution of the Production Machinery Combines to Consumer Goods Production. In: WIRTSCHAFTSWISSENSCHAFT No 3/1984, p 347 et seq.

3. Ibid, and: Experiences and Tasks in the Further Development of the Production of Industrial Consumer Goods (Proceedings). In: WIRTSCHAFTSWISSENSCHAFT No 6/1984, p 873 et seq.

4. Inasmuch as the concept of "balancing" differs from common Western usage, the following brief explanation is provided herewith: concomitant with the establishment of planning goals, production and consumption are considered together in a balancing system for the purpose of providing an economically optimal fulfillment of requirements and rationing scarce resources. Thus in balancing consumer goods, binding decisions about production and sales are made for the next planning period by plants and combines. While central authorities are partially responsible for verifying the balances, certain combines exercise limited balancing functions themselves.

5. Decree concerning the economic planning procedure, dated 7 December 1984. Special edition of the GDR Legal Gazette No 1190/1985, Part B, p 6.

6. From: The Inclusion of Production Machinery Combines and Plants in Consumer Goods Production (Proceedings). In: WIRTSCHAFTSWISSENSCHAFT No 7/1985, p 1053 et seq.

7. Ibid, p 1055

8. One example of such an in-house office is the Consumer Goods Advisory Office within the Central Metallurgical Engineering Enterprise (ZIM), which functions as a staff office of the Minister for Ore Mining, Metallurgy and Potash, with the task of coordinating market research and to make recommendations on product development. In: PRESSE-INFORMATIONEN, 11 October 1985, p 4.

9. Another indication for this is the fact that the Plan Fulfillment Report provides no information about the degree of compliance with the 5-percent quota; only combines with an exemplary showing are being cited. Nor is there any mention of this quota in the 1986 Plan for the Economy, nor in the speeches by Willi Stoph on the justification for the Economic Planning Law, or by Guenter Mittag in the Lower House on 1 December 1985. It is however still contained in the directive for the implementation of the 1986 Economic Plan.

10. Consumer Goods Supply in the GDR and Reciprocal Effects in Inner-German Trade, loc. cit., p 310.

11. Consumer Goods from Combines Engaged in the Production of Production Machinery. In: PRESSE-INFORMATIONEN, 5 February 1985, p 3/4. Also: Kurt Bernheier: Consumer Goods Production in the Production Machinery Combines. In: DER HANDEL, No 2/1985, p 14/15.

9273/12859
CSO: 2300/243

ACADEMIC, INDUSTRIAL COLLABORATION OUTLINED

East Berlin PRESSE-INFORMATIONEN in German No 28, 7 Mar 86 pp 2-3

[Interview with Prof Dr Ulrich Hofmann, first vice president of the GDR Academy of Sciences, date and place not specified: "Joint Basic Research With Combines"]

[Text] [Question] As the largest scientific institution in our country, the Academy already has manifold contacts with industry by way of economic arrangements. How does this manifest itself specifically in basic research?

[Answer] The GDR Academy of Sciences has always cultivated a close cooperation with industry, a cooperation which has become more and more fruitful for both sides. By now the Academy has integrated itself fully into the reproduction process of our society. More than 90 percent of its research and development capability is concentrated in the main fields of natural science and engineering, in line with the requirements of our economic strategy, with key technologies such as microelectronics, computer science, automation, new materials, and biotechnology receiving an increasing emphasis in our further streamlining.

In the last 5 years, our share in true record production contributions rose from 8 to 57 percent. More than 1,000 research results found applications in production. Proceeding from the basic requirements of the scientific-technical revolution, the 10th Conference of the SED Central Committee has made decisions that are designed to raise to a qualitatively higher level and to further develop in an economical way this cooperation in research among the Academy of Sciences, the universities and colleges, and the combines, especially those in industry.

What is new here is the greater influence to be exerted by the combines on the pattern and level of basic research, and also the fact that the influence of the Academy on the pattern and level of production will increase. By way of this more extensive commonality of efforts, more record contributions in science and engineering have to emerge. What is new is that targeted basic research that was already oriented toward products, processes, and technologies is now being linked in general with the combines by way of contractual arrangements. In any case, this amounts to about a third of our research capability.

[Question] What has taken place with respect to cooperation in research in preparation for the XI Party Congress of the SED?

[Answer] On the basis of the research ordinance of 12 December 1985, we are currently expanding and deepening substantially our relations with industry. This includes above all questions of analysis and prediction, conceptual work, the pattern with regard to subjects taken up, the specific goals and tasks, adequately providing for research in terms of personnel and materials, the exchange of cadres, and questions of the scientific manner of activity. In the interests of a greater output, a maximum savings of time, and a more systematic treatment of and certainty in transferring research results into production, we must have a new approach that lies in comprehensively and flexibly dealing with the individual phases in the science-engineering-production cycle by means of unified objectives. Previously it was sometimes still customary to work through these phases one after the other.

This year, about 45 percent of our research capability is linked by way of contractual arrangements to various combines in industry, 12 percent more than in 1985. By far the greatest portion of these arrangements are agreements we have made with partners in the field of electrical engineering and electronics, followed by the chemical industry. In the future, the share held by machine building will certainly increase, especially in connection with the development and application of key technologies. This presupposes a further streamlining and development of Academy institutes.

At present, we are working with 75 centrally-managed combines on the basis of about 600 economic arrangements, which as a rule have tasking workbooks [Pflichtenheften] associated with them. Our plans are to have brought as many coordination and service arrangements as possible into line with the new standards and the new legal regulations by the time of the XI Party Congress of the SED. This has already been done in quite a few cases.

[Question] What effects can be expected from this approach?

[Answer] Just as the ultimate purpose of any research is its social benefit, so all our measures are aimed at a greater economic and social effect. In this connection, we can proceed from good results. Especially in recent years a positive development has emerged, and it is essential to continue this with great vigor. Whereas in 1981 about 100 economically important results found practical applications, in 1985 the figure was far more than double this. Of the 1,062 patent applications from the Academy last year, 282 originated jointly with industry.

In the first year of utilization alone, our research results that have found practical applications have an effect equivalent to several billions of marks of goods production. Moreover, much of this cannot be expressed in terms of marks and pfennigs, such as seismic reports for the determination of production sites, predictions of fish hauls,

recommendations on territorial planning, or numerous other reports that contribute substantially to economically important decisions.

[Question] What outstanding results have Academy scientists and their partners offered?

[Answer] In preparation for the XI Party Congress of the SED, it has proved possible to provide outstanding examples, particularly in connection with the introduction of new key technologies. Thus, excellent results have been presented concerning the thermomechanical treatment of rolled higher-strength structural steels for welding. The basis for this was a close partnership between the Academy's Central Institute for Solid State Physics and Materials Research, the "Michael Niederkirchner" Rolling Mill VEB of Ilsenburg, the Metallurgy Electronics VEB of Leipzig, and the Freiberg Mining Academy. The materials-science and technological foundations worked out led to improved functional properties for this steel and to a reduction in process stages, in alloying agents, and in heat energy required. Today, a better steel quality is achieved with fewer workers, which ensures that the equipment for doing this will be exportable. At the same time, new areas of use were developed for this steel.

A collective from the Academy's Research Institute for Material Processing developed, along with the "Albert Funk" Mining and Metallurgical Combine VEB, a technology for the recovery of tungsten oxide from tin ore concentrates by hydrometallurgical means. This allows us to process in an economically efficient way raw materials that have an extremely small tungsten oxide content, and this is an outstanding development on the international scene.

Workers at the Central Institute for Genetics and Cultivated Plant Research at Gatersleben and at the Alcoholic Liquors, Wine, and Champagne Combine VEB of Berlin were able to make available for the first time in our republic production strains of microbes modified by genetic engineering, for the making of commercial enzymes. Their introduction into production took place at a point in time that was comparatively early by international standards, and they have had a great economic benefit. This is connected with a considerably higher productivity compared to conventional methods.

[Question] How do engineering schools as centers of joint research affect such results?

[Answer] At present there are 13 engineering schools at the Academy of Sciences. There, scientists further develop known technologies and also create, test, and prepare new ones for their industrial-scale application. At the same time, these engineering schools are useful also for the temporary pilot fabrication of new products.

Engineering schools are a crucial specific means of intensifying the interlinking of basic research and production. At the Engineering School for Crystal Growing of the Academy's Center for the Manufacture of Scientific Instruments, for example, equipment for the production of highly

pure silicon for microelectronics has been developed jointly with the Steremat VEB of Berlin ever since 1981. At the Engineering School for Industrial Microbiology of the Institute for Biotechnology, new procedures in biotechnology are being produced in cooperation with chemical equipment builders and scientists of the Institute for Industrial Microbiology. The Engineering School for Industrial Robots of Berlin is a joint institution of the Academy with the Central Industrial Installations Construction Combine for Metallurgy. There, modern sensors and control units for industrial robots are being created.

In the further development of cooperation in research, it is natural that the joint establishment and the joint utilization of engineering schools play an important role, as is shown also by our economic arrangements.

[Question] What collectives would you single out?

[Answer] I have already mentioned some. Let me add something also about our young scientists. They were represented by 12 exhibits at the international exhibition of young inventors in Plovdiv at the end of last year. Two of these, the laboratory fermenter from the Center for the Manufacture of Scientific Instruments, and the CCD line camera from the Central Institute for Cybernetics and Information Processes, the Institute for Space Research, and the Studio Engineering VEB, were honored with gold medals. The laboratory fermenter makes possible the production of biomass and the recovery of antibiotics, serums, and vaccines at all times under the biotechnologically most favorable living and growing conditions. The CCD line camera is used, for example, in connection with robot applications.

Among the 60 young researcher collectives at the Academy, the "Crystal Growing" collective in the Center for the Manufacture of Scientific Instruments deserves to be pointed out. On the basis of a tasking workbook, these young people are working on an improved technology for the purification and monocrystalline growing of silicon. It is just with the young researcher collectives that we have made the discovery that as a rule the highest objectives lead also to the greatest achievements. Here, an insight into political necessities coupled with a healthy ambition has proved to be extremely effective. In fact, with all our workers the social utility and the recognition of the results of their work have turned out to be what gives them their greatest sense of achievement.

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OPERATION OF HAJDUSAG AGROINDUSTRIAL ASSOCIATION DESCRIBED

Budapest FIGYELO in Hungarian No 7, 13 Feb 86 p 13

[Article by Dr Ivan Novobaczky: "Is Hage an Exception?" The first paragraph is an editorial introduction by FIGYELO.]

[Text] We have had a number of articles dealing with agroindustrial associations. We published articles on this theme in issues 9 and 13 of 1981, issue 35 of 1983 and issue 2 of 1985, among others. On this occasion the director of the Hajudsag Agroindustrial Association expresses his opinion about experiences in the operation of this form of undertaking.

The Hajudsag Agroindustrial Association (hereinafter, Hage) is a voluntary organization, one with property interest, of 16 Hajudsag enterprises--producer cooperatives, state farms and foodstuffs industry plants. The member farms or enterprises make their decisions by majority vote within the frameworks of the founding agreement, unanimously in other cases. Preparing and implementing the common decisions is the task of an independent special apparatus of 75 people headed by a director.

The director is responsible to the council of the Agroindustrial Association and has a co-ordinate relationship with the leaders of the member farms. Within the frameworks of the founding document and the decisions of the already mentioned council his decision authority and guidance responsibility pertain exclusively to the common property and the common organization.

Property Worth 1.5 Billion

An annual contribution to the common development fund is an obligation of the member enterprises of Hage undertaken for the long term. This is just as much an obligation as, for example, the harmonization of developmental and production plans. In general the size of the contribution is established for 5 years in advance. It is 17 percent of the current developmental funds of the member enterprises, more recently of their interest funds.

This economic fund, to which cash payment guaranties of the member enterprises also contribute, makes the association a credit-worthy partner.

The annual increment to the total development fund of Hage is 70-120 million forints. The net common property accumulated during the 9 years since it was founded comes to 1.5 billion forints--including the credits assumed and the normative supports. This is a significant achievement even if the accumulation period following the formation of Hage did coincide with the intensive development phase of agriculture, a period when it was possible to get credit relatively more easily and with more favorable interest payment conditions.

One of the development plans depending on the common financial funds is the grain production program. It has the goals of producing a modern production technology level, introducing energy conserving soil cultivation methods, building grain storage installations and switching to liquid artificial fertilizer and crop protection.

As a result of the program thus far the grain production (wheat and corn) of the Hage farms has increased in 9 years from 180,000 tons to 300,000 tons. The average yield for the last 3 years has been 6.3 tons per hectare for wheat and 8.6 tons for corn.

"Build It Yourself"

The goals of the industrial crops program were to produce conditions for complexly mechanized production of so-called money crops and to modernize the production culture for them. This program covers the cultivation of sugar beets, potatoes, sunflowers and hybrid corn. To do all this, however, it was necessary to win plowland by means of melioration, better use of grassland and a reduction in the amount of plowland producing bulk fodder.

The association also has programs for soil cultivation and melioration, slaughter animal production, fodder management and energy rationalization. It is worth speaking in more detail about the fodder management program. This is a regional industrial feed manufacturing and grain feed management vertical program which completely integrates fodder management for the Hage member farms and does so in part for farms outside the association.

The association takes care of having feed produced, of obtaining the grain feeds and protein feeds and of financing stockpiles. It manufactures feed supplements, and nutritional and pharmaceutical supplements. It organizes and directs marketing, develops a complete vertical product structure, etc. In the interest of this program Hage will buy a half-finished feed supplement factory in Karcag for 250 million forints and will complete it for an additional 200 million forints. Each year the vertical feed operation produces goods worth 3.8 billion forints.

Three Forints For One

Hage finished the first common medium-range plan with results above the expectations. Between 1976 and 1981 the member farms, as a whole and together in the common management sphere, increased personal incomes to 130 percent, assets to 150 percent, production value to 200 percent and profit to 263 percent--with no increase in personnel and at a time when the rate of growth

for withdrawals and for the prices of production factors exceeded that for the prices which could be obtained.

An evaluation of the second 5-year plan period for the association (1981-1985) is not yet complete. But it can be established already that the earlier dynamic trend in increasing efficiency did change. The improvement in efficiency did not keep up with the increase in withdrawals and so the specific performance indexes calculated at current prices deteriorated in comparison to the preceding plan cycle, although the improvement is still significant in the case of comparable conditions.

In the second 5-year plan cycle of the association it is primarily the achievements of the common management sphere which are outstanding. The ratio of the profit redistributed on the common property shares of the member farms varies between 20 and 30 percent per year. In the just completed 5-year plan period the model farms ["tangazdasagai" as published, "taggazdasagai" or "member farms" may have been intended] of Hage made a total of 526 million forints of capital available to the directorate of Hage, and they received awards of 1,344 million forints in return.

Despite this the internal life of domestic agroindustrial associations, and of Hage in particular, is not at all idyllic; clashes of interest and internal tension are not rare.

The interest of the member farms is tied primarily to the part of the property accumulated from the developmental (interest) funds handed over for common purposes. This gives them a right to a part of the profit deriving from use proportional to the property share. This would appear to be a simple property interest, or if you like a "capital" interest, but there are a number of other types of interests within the association. For example, deciding on the common developments and designating the place for them and the way they are used can affect the several member farms in the most different ways. These developments can represent customer markets or sources of primary material for them or sources of commodities or services, but they could be indifferent for them or even disadvantageous. This is the so-called functional interest. Operational interest is a unique version of plan enterprise interest, when what is involved is the operation under the heading of farm rent of common investments or tools of production, such as an animal breeding site or potato storage installation.

Hage has the practice of having common developments built by the construction branches of the member farms. Since the association has existed it has paid out at least 1.2 billion forints in contracting fees to its member farms, which naturally contains considerable profit too.

Proportional Interest

The various forms and versions of interest help to reduce clashes of interest to a great extent, help to make the interest harmonization mechanism work effectively. For example, if some member enterprise is forced into the background in regard to functional interest it can make it up as an operator or contractor, and vice versa.

Like the member farms the common organization is an independent legal entity, it manages independently, with this difference, that it redistributes to its member farms all of its profit, in accordance with the property shares. The member farms add this sum to the profit from their own enterprise operations and, in accordance with valid regulations, pay taxes on it or use it to generate interest funds.

The association, as the common organization, has a share only of the developmental funds of its member farms, generating therefrom the common development fund, working out proposals for the profitable use thereof, and implementing the decision. The personal material interest of the workers of the common organization depends on the profit redistributed to the member farms. In this system the interests of the member enterprises and of the common organization cannot diverge. The alienation so often objected to in the case of other types of associations is not characteristic in Hage.

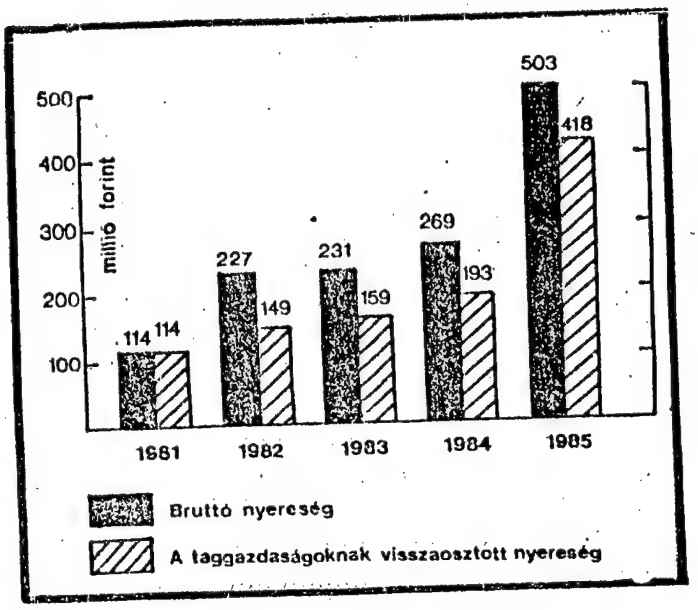
On the basis of the experiences of Hage the form of agroindustrial association developed in the Hajdusag is suitable for the development of vertical agricultural systems embracing a number of agricultural and processing industry operations. Vertical poultry and hog systems and the linked feed systems are examples of this. Actually one can thank the association for avoiding parallel investments or for the relatively swift realization of investments with the concentrated use of developmental resources. The organized and concentrated use of inadequately exploited intellectual forces also becomes possible within these frameworks. For example, Hage carried out the reconstruction of nine hog sites one after another, making it possible to use the earlier experience. The agroindustrial association also proved suitable for accumulating, from time to time, sums of free developmental money which the member farms would not have been capable of individually.

A Double Danger

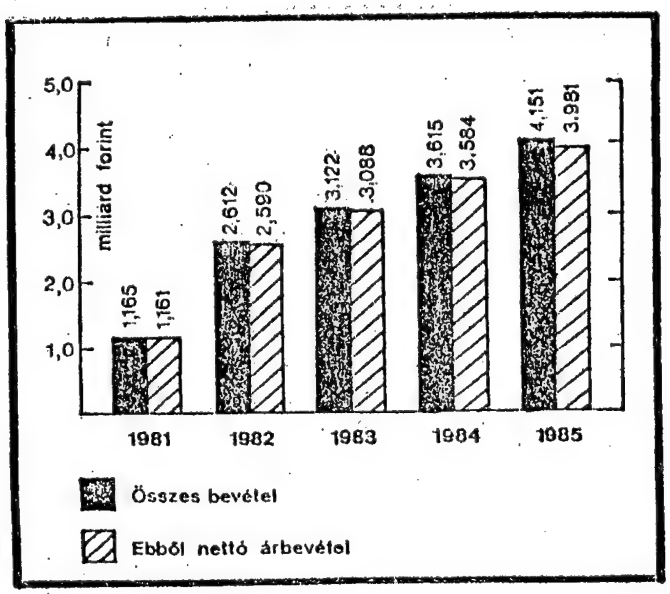
Guidance of an agroindustrial association and control of the harmonization of interests process is a touchy task if it is done without circumspection; then it can cause intolerable tensions and with the strengthening of partial interests a process of dissolution can begin. Of course, it can also happen that a common organization which takes on too much weight will greatly limit the independence of the member enterprises. So far, of the distortions mentioned, we can find in domestic practice more examples of the overemphasis on partial interests.

Of course it must be seen also that an agroindustrial association is capable in only a limited way of raising to a uniformly high level the production culture and financial performance of its member enterprises. Integration can help only if there is an appropriate receptiveness to it and if there are sufficient resources for a concentrated capital accumulation.

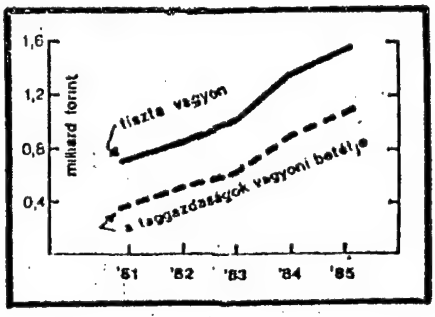
First graph: Development of Hage gross profit (solid bars) and profit redistributed to member farms (shaded bars), in millions of forints for the years 1981 to 1985.



Second graph: Development of Hage sales receipts, total (solid bars) and net (shaded bars), in billions of forints for the years 1981 to 1985.



Third graph: Net property of Hage (solid line) and the property deposits of member farms (broken line), in billions of forints, for the years 1981 to 1985.



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ECONOMY HUNGARY

ORGANIZATION OF ENTERPRISE WORK COOPERATIVES EXAMINED

Budapest HETI VILAGGAZDASAG in Hungarian 15 Feb 86 pp 36-38

[Article by Agnes Tibor: "Those Who Work in Small Groups"]

[Text] It is reported that a number of domestic institutions recently received an appeal to work out a method whereby the advantages of the VGMK's [enterprise work cooperatives] could be built into the main work time. Surely we can attribute to this official prompting the fact that at a recently held lecture several hundred people tried to become acquainted with a model of one version of an internal undertaking, a model which had not aroused too much interest earlier (we reported on the book by Istvan Siklaky in the 1 June 1985 issue of HETI VILAGGAZDASAG).

Whether the enterprise work cooperatives have the character of an undertaking or not has been the subject of debates for years. In general these debates faithfully reflect the momentary status of the skirmishes between those who take a stand for the VGMK system and those, on the other side, who see in the institution of the VGMK's primarily an uncontrollable and disproportionate outflow of income (and those who are left out of the VGMK's). But the debates say very little about why the VGMK's can or cannot be fitted into the enterprise organization. And under present conditions it would be difficult to answer this question, because payment out of the cheaper "cost forints" instead of the dear "wage forints" distorts the interest of the enterprises in making use of the work of the VGMK's. And the fact that the enterprise has a virtually unlimited say in the activity or undertakings of a work cooperative and assumes the responsibility of it makes an objective study difficult to a large extent.

According to many the VGMK has not been able to prove unambiguously that the entrepreneurial behavior which brings reserves to the surface can be created in small work groups being organized within the enterprise. Whether it can or not, this does not unconditionally mean that a large enterprise really is not a suitable arena for the modern economic behavior which brings good results in the small undertakings. At least, this is the position taken by those speakers who recently expressed their views about internal undertakings--those within an enterprise--before a populous audience at a forum of the TIT [Society for the Propagation of Scientific Knowledge], the Industrial Leader Training

Institute and the Coopsystem, held jointly with small undertakings dealing with enterprise organization.

The economist Istvan Siklaky, for example, described for the audience of nearly 200, most of them large enterprise workers in leadership positions, a model of an internal undertaking--a theoretical outline of the so-called Szentes experiment--which, as he said, had proved its viability with successful operation over almost 5 years. In this time Siklaky has supplemented at a number of points the entrepreneurial system based on the ideas of Tibor Liska--which caused great debates in their time. For example, he separated the leader of the internal undertaking from the other members of the collective--who do not assume any risk or decision making responsibility. In his talk he outlined the key questions of the division of labor, turned to the causes and consequences of the possible failure of an undertaking and described the steps whereby an undertaking can become independent. On the basis of his talk the model appears to be one which could be used by many managing units. Obviously this is why the talk of the representative of the Coopsystem was listened to with great attention when he described how an internal undertaking should be organized.

But several other contributions at the forum proved that some domestic managers are experimenting with the development of an internal undertaking system, not only at Szentes and not only by strictly following the model worked out by Tibor Liska. The Capital Repair Assembly Enterprise, for example, began to create a management and incentive system for its enterprise units according to the Szentes model but they are preparing to introduce a modification which will give the employees of an internal undertaking the right to decide whether the leadership role should go to the person who would unconditionally get it according to the bidding rules.

The Mecsek Coal Mining Enterprise also is preparing to develop a new type of internal undertaking system in the near future. The essence of this will be that the work groups to be established will have greater independence and greater responsibility than a VGMK, they will have a market link with the central units and with one another, and they will compete for the tasks planned by the center.

The internal undertaking experiments described at the forum--and there were at least half a dozen similar ones (for example those of the producer cooperatives, from Baksa to Imrehegy, from Karancslapujto to Vajta in Szabolcs, or the product patron system of Taurus)--suggest that even within the frameworks of the larger managing units it is possible to create conditions which will bring spectacular results in a smaller community, under conditions which can be reviewed by every participant, with direct material interest. In any case, not every type of economic organization has to put on the same clothes.

It is probable that the question will occur to everyone whether there really is no obstacle to the broad spread, even at the large organizations, of new types of internal undertakings, whether especially fortunate conditions did not create the conditions for internal undertakings at the managing organizations listed. Another speaker at the forum, the economist Peter

Szirmai, pointed out that a few lawful relationships can be demonstrated when reviewing the experiments in Hungary. For the most part the enterprises inclined toward internal undertakings are those which are in the biggest trouble. The Lenin Metallurgical Works in Diosgyor and the Danube Iron Works, both in an especially unfavorable situation due to the crisis in metallurgy, were among the first to show interest in internal undertaking systems, and one of the motives for the initiative of the Mecsek Coal MInes must certainly be sought here also.

Less interest in this is shown by those enterprises which, for example, are obliged by agreements forced upon them to make deliveries which are uneconomical for them or which have a supply responsibility in practice. In the case of such enterprises a counter-interest is created not only by the external conditions which are incalculable for them but also by the supports which they can collect for their sacrifices.

How can an averagely managing enterprise be induced to try out the new system? In all probability arguments which simply appeal to understanding will be completely without effect--such arguments as the fact that even the mammoth enterprises of Western Europe employ thousands of outsiders, that certain activities can be done in large organizations only with very bad efficiency, that large organizations can adapt to differentiating demands with greater and greater difficulty, that monopolies hinder competition and thus hurt the efficiency of the economy. It is doubtful that the majority of economic leaders can be led to share their power by persuasion alone; whatever type of internal undertaking is worked out, the independence which an entrepreneurial organization gets is lost by some leader of the parent organization.

In the longer run it might be trusted that the development of enterprise independence and the increse in the economic interest of the enterprises to the detriment of advantages of a non-market character, regulators which last for a longer time and enterprise plans which can be prepared for a longer term will permit more and more scope for internal undertakings, although it could be that the deteriorating market situation of the managing organizations will also facilitate this process. But in the shorter run--and this appears from the interest shown at the forum, among other things--it also counts that the news is spreading that the development of various types of internal undertakings is being urged even at the higher forums of economic guidance.

Questions and Answers

Not many researchers are studying the theoretical and practical possibility of undertakings within an enterprise in Hungary today, but for the most part those who do deal with the question interpret the associated concepts similarly. In what follows we will attempt to give a brief explanation of the most commonly used technical expressions and their interdependencies, in the form of questions and answers.

What characterizes an internal undertaking?

It is a self-accounting unit. The person or persons assuming the undertaking decide with relatively great independence about the size and composition of

the organization, about how to manage the resources--including development, expansion, narrowing or modifying the profile--and about market contacts. It is interested to a large degree in making a long-term profit, and its profit depends to a crucial degree on its market successes.

Who makes up the collective of the internal undertaking?

The members of an undertaking do not make up a homogeneous group. At the time of its formation the members agree on who will do what work, who decides in which questions, how much of the risk is being assumed and how the income is to be divided up. The person who bears the material risk and accordingly is responsible for the most important decisions connected with management is the entrepreneur of the collective.

What is the relationship of an internal undertaking to the parent enterprise?

It has a partner relationship. Market type contracts tie it to the other internal undertakings and to the central enterprise institutions. On the basis of such contracts it makes deals with partners outside the enterprise also; at such times the parent enterprise acts or can act as an intermediary and exercises or can exercise supervision.

How does the entrepreneur get the possibility for an undertaking and the assets that go with it?

In general by bidding. The undertaking goes to the person who promises the greater yield with responsibility (with a guarantee).

For how long a time can one acquire an undertaking?

In the case of contract operation, which today is the most widespread form of undertaking, for 3-5 years. (It is the disadvantage of this version that during this time the entrepreneur is in a monopoly situation, someone offering more advantageous conditions cannot take the undertaking from him. But it is the advantage of it that for these 3-5 years the entrepreneur is interested in enlarging the property. In the Szentes type model there can be a new bid for the undertaking at any time, the person operating the undertaking is not in a monopoly situation for even a moment, but his interest in enlarging the property is virtually unimpaired.)

What is the guarantee of the provider of the undertaking in the event of the failure of the undertaking?

In the case of contract operation the guarantee is the private property of the entrepreneur. In the Szentes type model it is to a larger extent the extra profit accumulating in a sequestered account.

To whom does the profit belong?

In the Szentes type model the profit going to the auction price belongs to the parent organization; the promised extra profit belongs to the entrepreneur--but it must be put in a sequestered account; any profit above this goes

straight into the pocket of the entrepreneur, and he can make free use of the interest on the sequestered account.

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ECONOMY

POLAND

MINISTER JOZWIAK ON 1986 DOMESTIC TRADE PLANS

Warsaw MERKURY in Polish No 2, 1986 pp 2,4

[Excerpts from a paper delivered by Jerzy Jozwiak, minister of domestic trade and services, at a marketable-trade conference]

[Text] A conference was held on 9 January 1986 by a marketable-trade organization to define commodity turnover tasks for this year. The opening paper was delivered by Jerzy Jozwiak, minister of domestic trade and services. This article comprises parts of that paper.

Domestic Trade Tasks in 1986. Among the main targets of the National Annual Plan (NAP) for 1986 are "improvement in the flow of consumer goods to the population, including more food and larger deliveries of basic-necessity commercial goods; improvement in quality and durability of products; greater availability of repair services; and improvement in management efficiency." But more important are the tasks which ensue from social anticipations, from the hopes for progress in stabilization of family life. To fulfill these hopes and anticipations, the primary tasks are not only economic, primarily they are social and political.

We will have to accomplish these tasks under the difficult conditions dictated by the overall economic situation. These conditions are:

--Limited possibilities of a real growth in deliveries. According to the provisions of the NAP, market deliveries will be 2.9 percent higher than last year and the total increase in deliveries of goods and services will be 3.25 percent. This increase is too small, therefore, to provide any leaway for maneuver.

--Inflation continues to be relatively high. True, retail prices in 1986 are to rise only 8.5-9 percent, but when combined with the effects of the prices increases which occurred in 1985, prices will rise 12-13 percent.

--It is obvious that with such a rate of inflation, and an inflationary gap estimated at 900-1,000 billion zlotys, heavy pressure of "hot" money on the market should be expected.

Directions of the Ministry's Policy on Commodity Matters. First of all, the food market: Attention will be concentrated on staples, establishing and expanding balance item by item. Together with the agricultural ministry we will expand sales of unrationed variety cured meats, allowing distribution indexes to be exceeded and at the same time allocating larger amounts of meat and casings for the production of cured meats from mutton, lamb and horsemeat. I am referring primarily to fruits and vegetables, dairy goods, and grain products. This year we will want to remove chocolate products and semolina from the ration list.

The goal of the ministry's market policy will be:

--first, to restore market balance on items of means of cleanliness,

--second, to ensure that consumer requirements for clothing and footwear are met. We are referring here to not only greater availability, but also to a conspicuous improvement in assortment, and style and quality, particularly of footwear,

--third, to achieve market balance in goods for children and youth, particularly clothing, school items, and toys. In implementing this policy, in coordination with the industrial branches, we will strive to make maximum use of those instruments of economic reform which stimulate the growth of marketable production.

In the broadest sense, the primary tasks of the trade organizations insofar as strengthening money-market balance is concerned, can be classified as follows:

First: It is absolutely essential that cooperation with industry be further improved, especially through use of the contract system and contract penalties to enforce adaptation of product assortments, quantities, quality, and regularity of deliveries to actual requirements.

Second: Greater advantage should be taken of the availability of goods produced by small-scale industry. We will examine the possibility of removing controls over goods produced by small-scale industry starting in 1978.

Third: We should do a better job of negotiating contract prices with industry. This is to protect the consumer against unwarranted price increases and to ensure that the negotiated prices are reasonable and fit actual market conditions.

Fourth: Trade organizations should ensure continuity of sales, in all areas of the country, of those goods which are in short supply nationally. Even temporary shortages of those retail goods which may be in warehouses or which can be supplied by industry without any limitations, are impermissible.

Fifth: In those articles in which full balance cannot be achieved in all areas due to overall economic conditions, proper proportions of distribution of supplies must be maintained and regional disproportions must not be permitted.

Measures to improve the quality of marketable goods must be enhanced. The producer has the primary responsibility for the quality of goods, but trade, too, plays a very important part. A very basic change is required in the attitudes of enterprises regarding acceptance of quality goods. This change must be demonstrated through a large increase in quality acceptance in the purchase of goods from industry, stricter requirements as to quality, consistent enforcement of price reductions, reclassification, contract penalties for poor quality, and even payment for damages.

The crucial problem, of course, is the policy of establishing trade margins. In 1985, based on a resolution passed by the Council of Ministers in December 1984, the first margin increase in many years was made in turnovers of food staples. In 1985 margins on commodities critical to farm production, such as coal and artificial fertilizers, were also increased. In addition, trade in the countryside was granted income-tax relief to compensate for higher turnover costs. In accordance with a government resolution dated 19 December 1985, margins will be increased annually until they reach the correct level, i.e., until 1990, and income-tax allowances will also be granted. Furthermore, measures will be taken to improve the degree of self-financing of trade's current operations, i.e., a gradual rise in the index of payment of turnovers out of prime funds. The increase in the margin on food articles, amounting to 18.5 billion zlotys, which will take place this year, and the granting of income-tax relief, will end the decline and begin the process of gradual improvement in profitability of trade, especially in food items and in the countryside.

The problem of establishing workers' wages is always vital. This has not yet been settled. The problem primarily is that of a wage formula, which is established by the minister of labor, wages and social affairs. Irrespective of this, the wage systems still must be improved in order to tie wages more closely to work results.

The new wage systems create opportunities to apply the right incentive systems. Thus far, 67 percent of the enterprises in state trade have introduced plant systems. In SPOLEM (food), 49 percent of the cooperatives, and in CZS (Central Union of Cooperatives) "Peasant Self-Help," 8 percent of the cooperatives, have introduced their own systems.

The functioning of trade is basically affected by its materials and engineering facilities. That is why attention should be focused on the following problems.

First: To ensure that in 1986 the increase in trade-servicing facilities will grow commensurate with at least the growth in population. The trade-service network in housing communities, according to the NAP, should be equivalent to 350 square meters per 1,000 residents. This requirement from the housing cooperatives should be checked and enforced. The local organs of state administration are responsible for seeing to it that the housing communities are built. The trade organizations, on their part, should establish close cooperation with these organs and the housing cooperatives in order to sign contracts ensuring that space is allocated in newly built housing communities for trade and services.

Second: In expanding the retail network, warehouse space must be able to grow in proportion to the growth in shop space. This task, as well as other capital-investment tasks, will be facilitated by granting credit preferences for trade and allowances for depreciation.

Third: Modernization of the trade network should be accelerated by expanding a network of shops which use modern selling methods, and especially self-service and pre-selection. In modernization, emphasis should be placed on equipping establishments with the indispensable machines and equipment and on maintaining existing machines and equipment in full operating condition.

Fourth: Emphasis should be placed on maintaining the existing operating network in good condition. This requires proper scheduling of repairs.

Fifth: Investment operating efficiency must be increased; for example, by building facilities according to schedule and putting them into operation quickly. Also, the size of unfinished capital-projects should be reduced and unproductive outlays should be frozen. The Market Expansion Fund, established in 1984, should provide assistance in building, particularly construction of large facilities, which exceeds the capabilities and funds of individual enterprises. Already in 1985, approximately 1 billion zlotys was expended from this fund. At the end of 1985, the fund's account showed a balance of 1,800 million zlotys, and 1986 revenues are estimated at 2,500 million zlotys.

Improvement in customer services is linked with the functioning of the establishment itself, how often it is closed down for repairs, inventory, etc. The minister's directive on a trade establishment's operating hours and the program of better service to the customer should be fully implemented. This directive requires that in 9 months, i.e., by 1 March 1986, technical changes must be made (night-delivery lockers) and changes in the scheduling of deliveries, so that establishments have goods on hand to provide uninterrupted service to customers.

We expect that after this time all enterprises will schedule deliveries of goods to shops which are staffed by more than one person in such a way that receipt of these deliveries will not interrupt service to customers. We will enforce a provision that the index of closed shops and those operating less than the required number of hours does not exceed 7-8 percent of the total number of shops.

From the reports we receive it appears that transport enterprises are interested in making deliveries outside of sales hours. But they are encountering difficulties in doing so from the trade organizations. This is surprising in view of the fact that the efficiency of night transport is greater than of day transport. Expansion of this form of delivery, therefore, has the effect of reducing transport costs, which, in view of the rise in hauling tariffs, is of considerable importance to the trade enterprises' profit figures. We mention this particularly because transport costs make up 30 percent of all trade costs.

The quality of service can and should be improved by greatly increasing the number of shops whose managers have extended authorization. We must overcome the present resistance of the enterprises in this area which is responsible for the fact that even many managers of exemplary shops, who presumably should have them, do not have such authorizations.

Our trade techniques, exhibitions of our goods, the form in which high-priced goods are sold, and the manner in which goods are sold and serviced, all need improvement. The deficiencies must be immediately corrected. This means, first of all, that supervision over the operation of retail centers must be increased and internal inspections must be improved. We must set up new or reactivate old trade organization and technique sections in enterprises and give workforce self-management organs a more conspicuous role in supervision. The basic tasks of domestic marketable trade require a large commitment and more efficient work on the part of the entire cadre, which comprises more than one million employees. for ultimately the successful accomplishment of these tasks depends on how they do their job. Improvement in wages through popularization of the principle that wages are tied to work results should make it possible to increase requirements. But it is also essential that work with the cadres be improved. To do this, we must make appropriate use of conclusions drawn from cadre reviews and dismiss those people who are dishonest and unreliable, who not only damage the reputations of their own enterprises, but also demoralize the honest employees. At the same time, we must actively and widely conduct employee training, improve working conditions, and expand social-welfare facilities.

Workers' self-managements function in all of the ministry's enterprises, and cooperative self-managements function in the cooperatives. These organs have not only learned how to use their rights, but they are also showing a great deal of initiative, innovation and creativity. The Ministry of Domestic Trade and Services intends to include them in the process of improving the functioning of trade and service to purchasers.

The quality of life of our society depends on how these expectations are fulfilled. We should remember this as we do our work in 1986.

9295
CSO: 2600/323

ECONOMY POLAND

FUTURE OF INDUSTRIAL ROBOTS EXAMINED

Warsaw GOSPODARKA PLANOWA in Polish 11-12 Nov-Dec 85 (signed to press 11 Feb 86) pp 572-576

[Article by Stefan Golab: "The Future of Robotics in Polish Industry"]

[Excerpts] Robotization in Poland was begun in the midseventies. The research and applications work done during this period resulted in construction of our own robots and manipulators and the still-current construction under the ASEA company license.

Scientific research and applications work is conducted mainly in industrial scientific research and development centers. In addition to the institutes under the jurisdiction of the ministries, the institutes of several technical academies, universities and the Polish Academy of Sciences, are involved in problems of construction, control, and drive, as well as other problems of robotics.

The work is coordinated by the MERA-PIAP Industrial Institute for Automation and Measurement. Eleven organizations take part in the program, including the aforementioned institute, the Institute of Precision Machines (IMP), the Central Machine Tool Design Office (CBKO), and the Machines Construction and Technology Research and Development Center (TEKO-MA).

Between 1976 to 1983, approximately 600 robots and manipulators were produced.

When we began the production of robots we were among the leading CEMA countries. Now, unfortunately, the situation is different. Apparently our lack of success is due in large measure to the fact that we emphasized the production of robots without giving proper consideration to the conditions under which robots could used.

The assumptions on the development of robotization in Poland were contained in the "Directional Program for the Development of Robot Production to 1990," which was approved by the Government Presidium in November 1984.

The main assumptions of the development of robotics in Poland were based on the experience of other countries in which robots had already been widely used. These assumptions include a growing shortage of labor, particularly in

arduous jobs--jobs which involve repetitious, monotonous motions, jobs in which objects being worked are very heavy, etc.

At the same time, large economic benefits can be gained through a concentrated use of robots and manipulators: increased productivity, addition of work shifts, etc. Also very important from this standpoint is the improvement in quality of operations performed which require high precision and repeatability. The elimination of human labor on jobs which are health-threatening is also of vital, even primary, importance.

It is assumed that in Poland the following processes will be robotized: welding and bonding, machining, plastic forming, spray application of protective coatings, assembly and checking (inspection).

Robots will also be used in specialized technological applications in such industries as: plastics, rubber, leather, clothing, processing of food articles, glass, ceramic, building materials, furniture, and others.

It is expected that by 1990 over half of the robots will be used in conditions which are arduous and damaging and threatening to human life, and in production processes where the noise level is extremely high, there is a large concentration of chemical compounds, dust, etc. The remaining robots will be used for various types of simple and monotonous jobs and for manipulation, in which their use supplements other automation of the technological process.

It is estimated that in the electrical machinery industry alone, over 10,000 jobs qualify for elimination of human labor from dangerous work.

Taking the above premises into account, two variants of robotization of industry have been assumed. In variant 1, it is envisaged that 12,000 robots and manipulators will be used in industry by 1990, including 1,000 in the electrical machinery industry.

In variant 2, which allows for a lower development of robot production and fewer needs on the part of industry, it is envisaged that 6,000 robots and manipulators will be applied by 1990, including 5,500 in the electrical machinery industry.

Random surveys of the demand for robots and manipulators in enterprises under the Ministry of Metallurgy and Machine Industry have shown that the needs first reported amount to 1,300 robots by 1990, which means that they differ greatly from the sizes of the potential needs determined on the basis of the premises examined up to now.

The reasons for this differ widely. Those mentioned most often include comments on the low reliability of certain types of Polish robots, their limited usefulness in robotizing various activities, and the fact that the robots are equipped with few production engineering tools. It should also be underscored that use of robots requires unvarying quality of materials and semifinished products, and that the work must be properly scheduled. Investment outlays are high and an additional problem is the difficulty in placing an order to design and execute the robotized jobs.

In forecasting the size of the demand during 1986-1990, it was envisaged that institutional measures will be taken to increase the interest of enterprises in using industrial robots and manipulators. These measures are intended not only to define the principles and size of the financial assistance to

enterprises, but to establish a list of harmful and dangerous jobs which must be robotized without fail.

Of the total amount of industrial robots and manipulators specified, it is estimated that approximately 50 percent will be permanently programmed manipulators. This amount does not include manipulators which are manually controlled directly by an operator.

In determining the potential demand of all industry for robots and manipulators, it was assumed that those types which have already been developed and put into use will be modified and new types will be produced. These, together with those which are imported, will make it possible to robotize other industrial processes and branches of industry.

The construction of robots and manipulators will take two principle directions. The first will be to perfect and modify, from the standpoint of efficiency, those constructions already developed. The second will be to develop designs of new types of robots and manipulators indispensable to the automation of processes which have not yet been robotized. This includes robots which can operate in high temperatures, aggressive surroundings, and a strong electrical and magnetic field.

It is assumed that simultaneously work will be conducted in connection with implementation of the General Agreement of the CEMA countries on the development of modern constructions of industrial robots and manipulators and control systems for machine tools, plastic working machines, and casting machines.

The applications planned for 1986-1990 require an intensive growth in production of robots and manipulators and achievement of a production level in 1990 amounting to 3,500 units in variant 1 or 1,900 units in variant 2.

Production may be by present producers and also in new enterprises of the machining, engineering equipment, and electronic industries, as well as others.

It is also anticipated that some industrial enterprises will produce robots and manipulators for their own needs, using standard elements and assemblies.

We know now that the main producer of robots will be the HYDOMAT Special Presses and Dies Factory in Warsaw.

We must stress that ultimately the size of production will depend not only on how the production of robots and manipulators develops, but also on the number of orders received from industry and the export potential. Production and numbers of applications may change depending upon these factors.

Conditions for the production of robots are an important problem, but just as production of other products, they constitute an engineering and organizational problem with which manufacturers must contend. In the case of robots, these problems particularly relate to drive and control assemblies, feedback systems, various types of gears, etc.

Without diminishing the importance of these problems, it should be said that the robot itself, together with the basic equipment such as a machine tool, press, furnace, etc., does not constitute a robotized work station. For such a station to function, various auxiliary equipment is indispensable--equipment such as work-station storage chambers, batchers, feeders, transporters, pallets, positioning equipment, and measurement-control (automated) equipment.

In some technological processes, in addition to the robot, other equipment is essential; for example, welding and bonding equipment, heads for cleaning and polishing surfaces, etc. The diversity of this equipment stems not only from technology, but also from the specific conditions at each work station. Experience has shown that the cost of this equipment may be half or more of the total cost of robotizing a work station.

Normally, the robot manufacturer does not produce the auxiliary or production equipment. But not until it is equipped with these items does the robot and the work station (production-process sequence) determine that robotization can be applied. Associating a suitable robot with the suitable--for a given job--auxiliary and production-process equipment, is a task for a design-engineer and for the user of the robot. This is a difficult task because there are limited supplies of these types of equipment in Poland. The importance of this cannot be overestimated. Robotization requires production of not just robots, but a great deal of much simpler equipment which ostensibly has little to do with robotization. At this time it is not a simple matter to coordinate the production of this mutually asssociated equipment.

Before a decision to use robots is made, the designer or user must investigate many problems.

Among technical-organization matters, for example, there is the need to examine the present and future production of robots from the standpoint of quantity as well as assortment, the stability of production over several years (5-7), mass production, the stability of the quality of materials and semifinished products used in robotized jobs, the arduousness of the work and the degree of danger in certain jobs, the scheduling of production in the workplace, and especially the production sequence in which the robots are to be used, the possibility of training the technical services to operate and program the robots, the length of time needed to design and set up robotized work stations (which should not exceed 2-3 years), etc.

Among the engineering problems, investigation of the following is particularly important: The degree of automation in the enterprise (due to the need to ensure specialized repair services), the possibility of using machine tools and process-engineering machines and equipment to work in conjunction with the robot (degree of automation, type or system of control, etc.), selection of optimal type of robot (degree of freedom, manipulation space, lifting capacity, type of drive, type of control, etc.), characteristics of object being worked (material, geometry, load, etc.), robot reliability and operating time, configuration and degree of technical complexity of robotized work station (line) in comparison with productivity of the entire production system (line, department, factory).

The particularly complex problems include the sociological ones, which have not yet been appreciated in applying robots. They result especially from the necessity of having the use of robots in enterprises approved by the workers and management cadre who are involved, the social and financial factors in the robotized jobs as they affect the workers, such aspects accompanying robotization as changes in workers' qualifications and their prestige, work productivity, mental strain, individual and group attitudes towards robotization in connection with difficulties in adapting and a sense of social threat, the necessity of changing occupations and undergoing vocational training by a certain group of workers, the forcing, by robots, of suitable productivity and quality of work, including on jobs preceding and following the robotized parts of production.

Next, the economic problems are now one of the most difficult problems to evaluate. Many factors must be considered in calculating the effectivenss of using robots.

In countries where costs of human labor are high, this is one of the more signicant elements in the calculation. In addition, consideration must also be given to quantity and quality of production, savings on social expenditures, workforce training, expenditures for health and occupational safety, etc. The entire problem is very complex. Based on the experience of the CEMA countries, it may be assumed that application of one industrial robot should replace 2 to 3 workers involved in direct production.

If employment is to be affected, industrial robots should be used in those industrial plants in which a suitable number of them can be installed (several, at least), and where the overall technical and cadre level of the plant is such that the robots can be fully serviced and maintained by the plant's own service personnel. In Poland, scientists from the Industrial Automation and Measurement Institute are working on methods to calculate the efficiency of the use of robots.

The economic effects of robotization, determined solely in terms of an enterprise applying robots, under present costs of this undertaking in Poland, are zero or very low.

In the rules being worked out for evaluation of the economic effects of robotization in Poland, it was considered indispensable to include the overall-social effects in the calculation, expressed by the amount of net output per one worker involved in direct production and the number of workers replaced by an industrial robot.

But it should be emphasized that the rules for calculating economic effects show that robotization will be most profitable to those enterprises whose net output per one employee is very high, i.e., the well-organized enterprise which robotizes not just individual jobs, but entire groups, lines, and production processes.

The determining factors presented above do not cover all of the problems which must be examined and solved in applying robotization. They are only a contribution to the whole complex range of indispensable measures which must be taken in order to implement the robotization program in Poland. But if they were to be overlooked, it might mean that this interesting project will not be understood by the workers and the engineering staffs who have such an important influence on the use of robots in industry.

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CSO: 2600/323

ECONOMY

ROMANIA

MINING PRODUCTION EQUIPMENT ACHIEVEMENTS REPORTED

AU251927 Bucharest AGERPRES in English 1622 GMT 25 Mar 86

/Text/ Bucharest AGERPRES 25 Mar 86--Among the latest top achievements in the manufacture of mining equipment is also the advancing combine for very hard rocks of CI-2 type put into serial production at the mechanical enterprise of Timisoara. Worth mentioning are also the two-arm pneumatically driven borers with an electropneumatic variant, and raise borders in two variants for very hard and hard rocks produced by the relevant enterprise in Baia Mare. Remarkable through their technological performances are the CMA-2-M and CMA-3 mechanical mining equipment turned out at Filipestii de Padure, the CA-1 and CA-2 combines for lignite seams of varous thicknesses. A highly complex mechanical equipment was produced for very thick coal seams.

Romania produces 12 types of highly complex mining equipment. To mechanize mining operations, original mechanical support systems have been manufactured. The "UNIO" enterprise in Satu Mare put into serial production the TR-7 conveyor with a loading capacity of 600 tons per hour. The same unit turns out conveying belts of 600 tons per hour. The same unit turns out conveying belts of 1,200 mm, and battery or trolley locomotives. New types of excavators, dumpers, borers, installations for petro-mining operations are produced at relevant enterprises in Timisoara, Tirgu-Jiu, Bocsa and Ploiesti. Other types of longwall cutters, loading machines, scoop shovels with a capacity of 1,200-2,400 tons per hour, storage coal handling equipment, and others will be turned out soon.

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CSO: 2020/112

ECONOMY ROMANIA

ENGINEERING, BUILDING COOPERATION CITED

AU261415 Bucharest AGERPRES in English 0940 GMT 26 Mar 86

/Text/ Bucharest, AGERPRES 26 Mar 86--At present, the specialists of the Romanian foreign trade enterprise "Romelectro" perform construction and assembly operations in the field of power engineering in Iran, Jordan, Egypt, Malaysia, Sudan, and elsewhere. Romanian specialists also carry out building operation at the 750 KV line connecting the electric power grids of the USSR, Romania and Bulgaria, a complex engineering work.

Specialized in drawing up surveys and projects, granting technical assistance, performing construction-assembly works, delivering equipment and plant, lending knowhow in power engineering and water management, including the commissioning of relevant units on a "turn-key" basis, the Romanian foreign trade enterprise is an active partner in the international market, and it performs specialized operations in scores of countries throughout the world. So, for instance, "Romelectro" has provided surveys and projects and granted technical assistance for electric and thermal power plants and district-heating units in India, Egypt, the GDR, the FRG, the People's China, for transformer stations, and aerial electric lines in Morocco, Kenya, Lebanon, Algeria. It has granted technical assistance to the builders of hydroelectric dams in Algeria and elsewhere.

So far, "Romelectro" has completed major projects, including low-, medium- and high-voltage aerial power lines (63, 132 and 230 KV) covering a total length of some 26,00 km, electric equipment deliveries for 376-km-long aerial power lines (132-230 KV) in Iran, about 700 km of 33- and 132-KV power lines and nearly 1,000 km of 33- and 132-KV electric lines in Iraq, various types of aerial power lines covering a total length of some 1,000 km in Egypt, Lebanon, and Malaysia. The Romanian company has built dams at Kasob and El Fakis in Algeria, assembled pipes for the boilers of companies in West Germany and pipelines for nuclear power plants in Austria, it has delivered hundreds of pylons (up to 100 meters high) to partners in Syria, Pakistan, and Iraq, transformer and distribution stations to Bangladesh, Morocco, Yugoslavia, Syria, India, Iraq, Egypt, the Philippines, Pakistan, Iran, as well as equipment for trolleybus lines in the capital city of Colombia.

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POLITICS INTERNATIONAL AFFAIRS

OFFICIALS HONOR HUNGARIAN NATIONAL DAY

Assembly Presidium Greetings

AU041126 Tirana ATA in English 0920 GMT 4 Apr 86

/Text/ Tirana, 4 Apr (ATA)--The Presidium of the People's Assembly of the People's Socialist Republic of Albania sent the following message of greetings to the Council of the Presidency of the Hungarian People's Republic:

"On occasion of the National Day of the Hungarian People's Republic, we convey to you the best wishes for the wellbeing and prosperity of the Hungarian people."

Kaplanni Attends Embassy Reception

AU061639 Tirana ATA in English 0910 GMT 5 Apr 86

/Text/ Tirana, 5 Apr (ATA)--On occasion of the National Day of Hungary, the charge d'affairs a.i. of the Embassy of the Hungarian People's Republic to the People's Socialist Republic of Albania, Istvan Kadar, gave a cocktail at the embassy seat last night.

Present were the vice minister of foreign affairs, Muhamet Kaplanni; the vice minister of foreign trade, Pajtim Ajazi, and other guests.

Attending were also heads and functionaries of the diplomatic representations accredited to the People's Socialist Republic of Albania.

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CSO: 2020/111

POLITICS

INTERNATIONAL AFFAIRS

BRIEFS

SHEVARDNADZE PRAISES CEAUSESCU-ZHIVKOV APPEAL--Moscow AGERPRES 13 Mar 86--The Soviet Union highly assesses Romania's and Bulgaria's initiative contained in the "Declaration and Call" of the president of the Socialist Republic of Romania, Nicolae Ceausescu, and the president of the State Council of the People's Republic of Bulgaria, Todor Zhivkov, on the achievement of a chemical-weapon-free zone in the Balkans. This initiative is consonant with the well-known proposal the Warsaw Treaty participating countries set forth to free Europe from chemical weapons. In the event of the creation of a suchlike zone in the Balkans, the USSR is ready to respect and guarantee its status, naturally, if the United States also does it. These assessments were made by the foreign minister of the USSR, Eduard Shevardnadze, when he received, in Moscow, the Romanian and Bulgarian ambassadors, who were empowered by their governments to hand-deliver him the text of the "Declaration and Call." The Romanian and Bulgarian ambassadors emphasized that the proclamation of the Balkans as a chemical-weapon-free zone would be a major step on the path of freeing the whole of Euorpe from an extremely dangerous class of weapons and would contribute to building confidence and strengthening collaboration among the countries and peoples of the region. Moreover, it could make an effective contribution to the efforts deployed for a general and total ban on chemical arms, for the destruction of existing stocks, to the stimulation of the negotiations under way to that effect. /Text/ /Bucharest AGERPRES in English 1812 GMT 19 Mar 86 AU/ 12228

PACT MINISTERS MEET WITH JARUZELSKI--Warsaw AGERPRES 20 Mar 86--On behalf of Nicolae Ceausescu, general secretary of the Romanian Communist Party, president of the Socialist Republic of Romania, Wojciech Jaruzelski, first secretary of the Central Committee of the Polish United Workers' Party, president of the Council of State of the Polish People's Repbulic, was conveyed warm comradely greetings and the best wishes. Wojciech Jaruzelski thanked and requested that Nicolae Ceausescu be conveyed cordial friendly greetings. The exchange of messages was occasioned by the call on Wojciech Jaruzelski in the capital of the Polish People's Republic of Ille Vaduva, Romanian foreign affairs minister, and by the other ministers that attended the meeting of the Committee of Foreign Ministers of Warsaw Treaty participating states. /Text/ /Bucharest AGERPRES in English 1900 GMT 20 Mar 86 AU/ 12228

HUNGARIAN AMBASSADOR MEETS PRESS--Bucharest AGERPRES 27 Mar 86--A press conference was held at the Hungarian Embassy in Bucharest on 27 March, in marking the forthcoming national holiday Hungary--the 41st anniversary of that country's

liberation. Ambassador Szuts Pal, referring to the celebrated event, evoked the contribution made by the Romanian Army that fought battles full of heroism and sacrifice along with the Soviet Armies for Hungary's liberation from fascist domination. The major achievements of the Hungarian people in building the socialist society were presented, as well as the socioeconomic development directions over 1986-1990. The good relations between the RCP and the HSWP, between the two countries were presented, and the importance of the talks between Nicolae Ceausescu and Janos Kadar for the expansion and diversification of the bilateral relations, in the interests of the two peoples, of the cause of socialism. /Text/ /Bucharest AGERPRES in English 1903 GMT 27 Mar 86 AU/ 12228

ROMANIAN-SFRY ECONOMIC COMMISSION ENDS SESSION--Belgrade, AGERPRES 6 Mar 86--Over 4-6 March Belgrade was the venue of the proceedings of the 16th session of the Joint Romanian-Yuglsav Commission of Economic Collaboration. The Romanian delegation was led by Vasile Pungan, minister of foreign trade and international economic cooperation, cochairman of the commission, and the Yugoslav delegation by Milenko Bojanic, federal secretary for foreign trade, cochairman of the commission. During the proceedings, the two sides agreed on palpable measures to fulfill the tasks set during summit meetings to boost and diversify the economic links between Romania and Yugoslavia, and they were enshrined in a protocol signed at the end of the session. The Romanian chief delegate was received by Lazar Mojsov, member of the Presidium of the Socialist Federal Republic of Yugoslavia, Borislav Srebric, vice president of the Federal Executive Council of the Socialist Federal Republic of Yugoslavia, and Branislav Ikonic, president of the Executive Council of the Assembly of the Socialist Republic of Serbia. /Text/ /Bucharest AGERPRES in English 1748 GMT 6 Mar 86 AU/ 12228

CSO: 2020/118

ALIA, OTHERS HONOR GREEK NATIONAL DAY

Alia Message to Sartzetakis

AU250925 Tirana ATA in English 0730 GMT 25 Mar 86

/Text/ Tirana, 25 Mar (ATA)--The president of the Presidium of the People's Assembly of the People's Socialist Republic of Albania, Comrade Ramiz Alia, sent the following message of greetings to the president of the Greek Republic, Khristos Sartzetakis:

"On the occasion of the National Day of the Greek Republic I have the pleasure in the name of the Albanian people, the Presidium of the People's Assembly and in my name to convey to you and through you to the friendly Greek people cordial greetings and the best wishes for the progress and prosperity of the country. I express the conviction that the relations of friendship and cooperation between our two countries, which are developing on the way of goodneighborliness, will strengthen further more /as received/ in the future, to the common benefit of our two peoples, peace and security in our region.

Malile, Geprifti Attend Reception

AU261440 Tirana ATA in English 0900 GMT 26 Mar

/Text/ Tirana, 26 Mar (ATA)--On occasion of the National Day of the Greek Republic, the ambassador extraordinary and plenipotentiary of the Greek Republic to the People's Socialist Republic of Albania, Apaostolos Papasliotis, gave a reception last night.

Present in the reception were the minister of foreign affairs, Reis Malile; the minister of foreign trade, Shane Korbeci; the chairman of the Executive Committee of the People's Council of Tirana District, Llambi Geprifti; the president of the Academy of Sciences, Prof Aleks Buda; deputies to the People's Assembly, working people of science, culture, art, press and other guests.

Present were also heads and functionaries of the diplomatic representations accredited to the People's Socialist Republic of Albania.

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CSO: 2020/114

POLITICS

ALBANIA

BRIEFS

SWEDISH KING RECEIVES DEPARTING ENVOY--Tirana, 26 Mar (ATA)--The king of Sweden, Carl XVI Gustaf, received the ambassador extraordinary and plenipotentiary of the People's Socialist Republic of Albania in Sweden, Izedin Hajdini, on occasion of his transfer. The reception passed in a friendly atmosphere. /Text/ /Tirana ATA in English 0900 GMT 26 Mar 86 AU/ 12228

ALIA GREETS BANGLADESH'S ERSHAD--Tirana, 26 Mar (ATA)--Comrade Ramiz Alia, president of the Presidium of the People's Assembly of the People's Socialist Republic of Albania, sent the following message of greetings to the president of the People's Republic of Bangladesh, Hussain Mohammad Ershad: "On occasion of the National Day of the People's Republic of Bangladesh, I convey to you cordial greetings and to the friendly people of Bangladesh the best wishes for progress and wellbeing." /Text/ /Tirana ATA in English 0900 GMT 26 Mar 86 AU/ 12228

CSO: 2020/114

POLITICS ROMANIA

RCP SENDS MESSAGE TO PORTUGUESE COMMUNIST PARTY

AU142131 Bucharest SCINTEIA in Romanian 6 Mar 86 p 5

/Text/ To the Portuguese Communist Party /PCP/ Central Committee

Dear Comrades,

The 65th anniversary of the PCP gives us the pleasant opportunity to convey to you warmest greetings and wishes for new successes in your activity devoted to the fulfillment of the Portuguese working people's aspirations for freedom and wellbeing.

The high prestige enjoyed by the PCP is part and parcel of the heroic sacrifice-filled struggle against fascist dictatorship, of the responsibility with which it acts to promote the interests of the workers class and of the Portuguese people, and of the active contribution it makes to strengthen the progressive and anti-imperialist forces everywhere and the cause of peace and understanding among all nations of the world.

The RCP and our whole nation follow with keen interest and feelings of solidarity the activity carried out by your party for the renewing changes in the life of the Portuguese society, for democracy, and for social progress.

We stress with particular satisfaction the good relations of friendship, cooperation, and solidarity existing between our parties, relations to which the meetings and fruitful talks held between Comrade Nicolae Ceausescu, RCP secretary general and Comrade Alvaro Cunhal, PCP general secretary made a significant contribution.

We express our belief that these relations will continue to develop in the future too, in the interests of the two parties, countries, and people, and the cause of peace and understanding throughout the world.

The RCP Central Committee

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POLITICS ROMANIA

CEAUSESCU BIRTHDAY MESSAGE TO MONGOLIA'S BATMONH

AU151639 Bucharest SCINTEIA in Romanian 9 Mar 86 p 5

/Text/ To Comrade Jambyn Batmonh, general secretary of the Central Committee of the Mongolian People's Revolutionary Party /MPRP/ and chairman of the Presidium of the People's Great Hural of the Mongolian People's Republic.

Esteemed Comrade Batmonh:

On the occasion of your 60th birthday, I convey to you warm greetings and best wishes on behalf of the RCP Central Committee, the State Council of the SR of Romania, the Romanian people, and on my own behalf.

The Romanian communists and working people follow with feelings of friendship and solidarity the outstanding achievements attained by the Mongolian people, under the MPRP leadership in building its socialist country and the intensive creative activity they carry out to prepare for the 19th Congress of the party with new and great achievements.

I express my belief that, through joint efforts, the traditional relations of friendship between our parties and peoples, the fruitful cooperation, and collaboration between Romania and Mongolia will continue to develop more strongly, in the interest of the socialist construction in our two countries, and the general cause of socialism, progress, and peace throughout the world.

I wish you, esteemed Comrade Batmonh, much health, long life, working energy, and new successes in your entire activity devoted to the manysided development of the homeland and to the prosperity and happiness of the friendly Mongolian people.

Nicolae Ceausescu, RCP secretary general and president of the SR of Romania.

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POLITICS ROMANIA

RCP SENDS MESSAGE TO INDIAN CP CONGRESS

AU251948 Bucharest SCINTEIA in Romanian 12 Mar 86 p 5

/Text/ Dear Comrades,

On behalf of the RCP and its secretary general, Comrade Nicolae Ceausescu, we convey comradely greetings and best wishes to the delegates to the 13th Congress of the Communist Party of India /CPI/ and to all the militants of the party.

The communists and the working people in the SR of Romania follow with keen interest and sympathy the activity carried out by the CPI to promote the friendly Indian people's interests and fundamental aspirations for progress and wellbeing, and to promote the democratic development of the country, and the general cause of socialism and peace throughout the world. We believe that the goals and targets you set forth at this congress and the decisions you will endorse will raise the activity of your party to a new, superior level and will further increase the role and the influence of the party on the people's masses and on the political and social life of the entire country.

The RCP--which this year celebrates the 65th anniversary of its creation--consistently works to unite the efforts of the entire nation in order to unflinchingly implement the program of socialist construction endorsed by the 13th RCP Congress regarding Romania's passage to a new socioeconomic development stage, and at the same time carries out intensive international activity devoted to peace and cooperation among nations and to finding constructive solutions to the great and complex problems confronting our times. In this spirit we strengthen cooperation and solidarity with the other communist and workers parties and with the revolutionary, democratic, and progressive forces everywhere in the struggle for peace--the major problems of our times--for disarmament, primarily nuclear disarmament, to eliminate the use of force in international relations and find peaceful solutions to interstate disputes, to eliminate underdevelopment and establish a new international economic order, and to build a better and more just world on our planet.

Within this context, we would like to stress with satisfaction the good relations of cooperation and solidarity established between the RCP and the CPI and to express our belief that these relations will continue to develop in the future for the wellbeing and in the interests of the Romanian and Indian peoples, and to strengthen cooperation between them and among all the democratic, progressive, and anti-imperialist forces in the struggle for social progress and peace throughout the world.

With this belief, we convey wishes for the complete success of the proceedings of your congress.

The RCP Central Committee

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POLITICS ROMANIA

DELEGATE ADDRESSES GENEVA DISARMAMENT CONFERENCE

AU132002 Bucharest AGERPRES in English 1915 GMT 13 Mar 86

/Text/ Geneva AGERPRES 13 Mar 86--Romania's consistent position on the priority of nuclear disarmament, the significance and topical character of President Nicolae Ceausescu's proposals and considerations on peace defense, the cessation of the arms race and a passage to specific disarmament measures, of scrapping nuclear weapons were set forth by the Romanian representative at the Geneva disarmament conference.

The Romanian delegate also stressed that most resolute action should be taken for the substantial reduction of troops, conventional weapons and military spending, for the renunciation of force and the settlement of all interstate litigious issue by negotiations only.

Referring to the need for the unfolding with positive results of the disarmament conference, the Romanian representative pointed out that a special committee of the conference should be set up to conduct multilateral negotiations on the conclusion of a treaty banning all nuclear tests. The need was also stressed for the resumption of the activity of the special committee dealing with the problem of making efficient international arrangements to give guarantees to the states that do not possess nuclear weapons, that nuclear weapons would not be used against them and they would not be threatened with the use of suchlike weapons.

In connection with the prevention of the arms in outer space the Romanian representative showed that the exploration and use of outer space, including the moon and other celestial bodies, should be made for exclusively peaceful purposes.

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POLITICS

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SCINTEIA VIEWS SIGNIFICANCE OF POLLS IN SPAIN, FRANCE

AU261613 Bucharest SCINTEIA in Romanian 20 Mar 86 p 6

/Romulus Caplescu article: "The Significance of Some Referendums"/

/Excerpt/ Referenda took place in a number of West European countries in the past few days within the framework of which voters were called upon to decide--it is true--differing problems from country to country. However, all of them are of particular political importance for the countries themselves and for the international arena. Therefore, the results of these polls lead to conclusions and interests which surpass the framework of the given countries.

As is known, in Spain this poll took place in the form of a referendum on its membership or nonmembership in NATO. This is a problem that was on the agenda immediately after the 1982 parliamentary election, an election that was won by the Spanish Socialist Workers Party on the basis of a platform that stipulated, as one of its main points, Spain's severance from NATO; later this question was the subject of intensive political discussions with intricate and contradictory issues. During the years that have passed since then, the leadership of the socialist party changed its initial position and turned into a partisan of continuing the country's NATO membership.

Indeed, the fact that the main party in Spain, the ruling party with its afferent possibilities, advocated Spain's NATO membership, carried great weight in the balance of the referendum results. As a matter of fact, political observers stressed that even the way in which the questions that had to be answered by the voters were formulated was not very clear because the questions were equivocal in the sense that they did not actually refer to Spain's staying in NATO or leaving it, but to ways and means of Spain continuing to be a member of this alliance.

Worthy of mention is the fact that on the eve of the referendum pressure at home intensified considerably with a view to maintaining Spain's NATO membership; there were a number of statements and warnings that Spain's severance from NATO would entail "baneful consequences" for Spain and would lead to "the country's isolation." The argument was conjured up that the burden of military expenditure would increase (as if NATO were not the motive power of increasing those expenditures!); even those frame of minds of public opinion which do not favor the United States were used to achieve a positive outcome in the referendum--

in the sense that it was stated that if Spain were to leave NATO there would be no other option than strengthening bilateral Hispano-American relations, something that is not very popular with a lot of people.

One should not underrate pressure from outside either, especially in view of the key strategic position of Spain in the structure of NATO as the "gate to the Mediterranean" and as the turntable between the American continent, Western Europe, Africa, and the Middle East. Finally, neither can aspects of an economic nature be ignored, since the NATO partisans are striving by all ways and means to promote the idea that Spain's recently established membership in the Common Market could be compromised if its membership in Western economic bodies were not also confirmed by its membership in military bodies.

Under these circumstances, a majority of votes was obtained for Spain's membership in NATO. At the same time, one cannot ignore the small difference between the coefficient of the two options and the fact that, despite intensive pressure, almost 40 percent of the voters were for withdrawal from NATO. And one should not only speak of numbers, but also about the fact that those who were for Spain's withdrawal from NATO represent the most active strata of the society. The scope and especially intensity of the anti-NATO movement were amply proved by the broad demonstrations in the main cities of the country, including the one in Madrid that is viewed as the largest in the last half of the century. Certainly, in conformity with the results of the referendum, Spain will stay in NATO, a fact which--it must be admitted--is not part and parcel of the historic desideratum of eliminating the bloc policy, and of reducing and eliminating blocs. On the other hand, the concrete aspects of this referendum unequivocally demonstrate how large those forces are which act--and without doubt will continue to act--to support this great desideratum.

A few months before the parliamentary--and regional--elections in France a "dramatic overturn" of the balance of force was forecast, an overturn that did not take place, however. In actual fact, one could say that the "victors" also have reason for dissatisfaction, just as the "losers" have reasons for satisfaction.

Indeed, the right-centrist parties (the rally for the Republic and the Union for French Democracy), together with other smaller groupings, won the majority of votes, but their victory is undeniably much smaller than they had hoped for. All together, they will have extremely limited latitude in the National Assembly (only two mandates exceeding a strictly necessary majority, that is half plus one), a fact that will certainly give rise to quite a few problems and will create a number of difficulties. As far as it is concerned, the French Socialist Party, although it has lost quite a large number of mandates, can find consolidation in the fact that it continues to be the party with the greatest number of supporters in the country, something that will permit it to continue to have an important say.

Certainly, in the wake of the election results, a completely new and unprecedented situation has been created in the Fifth Republic, namely, President Francois Mitterrand, who was elected to this position as leader of the Socialist Party whose mandate will continue for another 2 years, is now in the position

of exercising his mandate while the opposition parties hold the majority in parliament and under conditions in which he will have to cooperate with a government made up of representatives of those parties. Proceeding precisely from this aspect, observers ask themselves the question to what extent will "cohabitation," as this formula is termed, prove viable, and also remark that both sides have expressed the desire to cooperate within the framework of national institutions.

As far as the Communist Party is concerned, although the tendency of falling back registered in the past years has been the subject of many analyses and discussions in its various bodies, this tendency unfortunately continued during the current poll. In this connection, it was stated that the smaller number of votes achieved was because of the so-called "useful vote," that is, the vote that communist voters in a number of electoral districts gave to socialist candidates with more consistent chances in order to strengthen their positions and to prevent the election of rightist representatives. Assessing the election results as a negative phenomenon for the working people, the French Communist Party called for the unity of the progressive forces in the struggle against unemployment and inequities and to protect the social achievements and freedoms.

The ascent of the extreme rightists represented by the National Front and a few other groupings was assessed as an aspect of particular concern. It is known that the National Front's program is profoundly reactionary and of a strongly racist nature, including stirring up violence against immigrant workers." In the National Assembly will we hear the voices of elements that play with the idea of fascism?"--political circles and democratic publications ask. It goes without saying that the effects of the economic crisis, persistent unemployment, and a certain xenophobia have created a situation viewed as a sign of alarm for democracy.

These are only a few aspects suggesting--as the majority of observers indicate--that French political life has entered a stage that could turn out to be quite a complex and complicated situation.

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DINCA MEETS DPRK LEADER KIM IL-SONG IN PYONGYANG

AU261916 Bucharest AGERPRES in English 1758 GMT 26 Mar 86

/Text/ Pyongyang AGERPRES 26 Mar 86--Kim Il-song, general secretary of the Central Committee of the Workers' Party of Korea, president of the Democratic People's Republic of Korea, received on 26 March Ion Dinca, member of the Executive Political Committee of the CC of the RCP, first deputy prime minister, chairman for Romania of the Joint Intergovernment Commission on Economic, Technological and Scientific Collaboration, now in Pyongyang for the 12th session of the commission.

President Kim Il-song and Mme Kim Song-ae were conveyed a message of friendship, warm greetings and wishes of fresh and big successes in the work of socialist construction, in the attainment of the Korean Nation's vital desideratum of peaceful and independent unification of the homeland, in behalf of Nicolae Ceausescu, general secretary of the Romanian Communist Party, president of the Socialist Republic of Romania, and of Mme Elena Ceausescu.

Thanking for the message Kim Il-song requested that Nicolae Ceausescu and Mme Elena Ceausescu be conveyed in his behalf and in behalf of Mme Kim Song-ae a fraternal salute, wishes of good health and personal happiness as well as of fresh and big victories in the building of the multilaterally developed socialist society in Romania.

The Korean party and state leader assessed highly the dynamic activity and persevering efforts of President Nicolae Ceausescu devoted to the defense of peace, to disarmament, nuclear above all, to understanding among peoples, to collaboration and friendship in the world.

Expressed were also keen thanks for the active support given by the Romanian Communist Party, by the Romanian Government, by President Nicolae Ceausescu personally to the Korean people's just cause of peaceful and independent unification of the Korean nation.

Evoking with satisfaction the summit meetings and fruitful talks in Bucharest and Pyongyang, they highlighted the possibilities to continously amplify the relations of friendship and multilateral collaboration, to increase the economic and commercial exchanges and the cooperation in dominas of mutual interest between the two countries.

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AGERPRES OUTLINES WORKERS CONTROL MEETING REPORT

AU271954 Bucharest AGERPRES in English 1919 GMT 27 Mar 86

/Text/ Bucharest AGERPRES 27 Mar 86--The working people's control is one of the most direct forms of the working people's carrying out their responsiblity as producers, owners and endusers of the social wealth--shows the report presented at the conference held on 27 March in Bucharest of the representatives of workers control in Romania.

Highlighting that the permanent deepening and development of worker, revolutionary democracy, the creation and steady improvement of political-organizational structures apt to ensure the working people's participation in leading the whole process of economic and sociocultural construction is a salient feature of the evolution of the contemporary Romanian society, the report mentions that within the broad democratic system of people's ruling the country, the working people's control has become a genuine school of civil responsibility, self-administration and civic self-management. The report shows in this connection that there are currently in Romania some 49,000 teams of working people's control enrolling about 194,000 citizens who carry on control in 154,000 goods production and sale units, public catering units, warehouses, silos, market places, hostels and boarding schools, spas and public services. These teams take care of the proper administration of the means entrusted by the society to the respective units, the strengthening of the spirit of order and discipline at workplaces, take care that the working personnel in those units show an advanced attitude towards the population.

After highlighting the important contribution made to the organization and carrying out of the worker control by the trade unions, the women's and youth organizations, socialist democracy and unity the organizations, the report mentions that in 1985 the working people's control teams carried out almost 434,000 control actions, that results in numerous proposals, intimations and suggestions apt to help improving the activity in the respective units. At the same time, the control teams promptly reported to the responsible factors the instances of law infringement and took action to prevent and eliminate negative states of affairs.

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CEAUSESCU CHAIRS RCP POLITICAL BODY MEETING

AU282012 Bucharest AGERPRES in English 1859 GMT 28 Mar 86

/Text/ Bucharest, AGERPRES 28 Mar 86--The Executive Political Committee of the CC of the RCP that met on 28 March under the chairmanship of Nicolae Ceausescu, general secretary of the Romanian Communist Party, debated a string of questions of the home political, economic and social life. The executive Political Committee debated and endorsed the report on the analysis relying on the sum up of the results scored in the national economy as a whole, the formation and utilization of the financial resources in 1985.

A program of measures was endorsed, meant to ensure, concomitant with the rhytical fulfillment of the plan provisions, also the achievement of higher efficiency in all domains of activity. It was decided that the report should be submitted for debate to the plenary meeting of the party's Central Committee convened on 1-2 April 1986.

The Executive Political Committee then analyzed measures for the improvement of the economic activity, the consolidation of worker self-management and economic and financial self-administration. In that frame, the proposals were debated, regarding the normatives of establishing the value of production contingent upon the fixed assets employed. The proposed normatives--that should be considered minimal--pursue a substantive improvement of the efficiency of employment of the fixed assets, a more marked increase of industrial production and economic efficiency, the increase of the national income.

Discussed was also the report on improvement of production and labor organization, modernization of manufacturing technologies, application of the overall and piece-rate agreement, increase of efficiency in the economy as a whole.

Likewise, the meeting discussed the proposals regarding the granting of money advances to state-run and cooperative farms, to the members of cooperative producer farms and private farmers that sign contracts on the delivery of farm produce to the state stock, as well as the granting of credits for productive activity.

In connection with these questions, stress was laid on the need to improve the financial control, so that it may properly fulfill its role and responsibilities in ensuring an adequate administration of the material and money funds of the economic units.

The Executive Political Committee examined the bill on the overall and piece-rate agreement remuneration of the working staff. /sentence as received/ In the elaboration of this bill account was taken of the current stage of socio-economic development, the requirements for the improvement of the economico-financial mechanism, the strengthening of self-management, self-administration and the organizational framework of worker democracy. The bill stipulates the application of overall and piece-rate agreement remuneration forms in all economic units and for all staff categories so as to more closely link individual incomes to the fulfillment of the planned tasks, the implementation of the physical and export production, the increase of the share held by high quality products and the reduction of specific consumption of raw and subsidiary materials, fuel and energy, and to the growth of labor productivity and economic efficiency. It was decided to submit this bill for debate and approval to the Grand National Assembly convened for 3 April.

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REPORTAGE ON SDUF NATIONAL COUNCIL PLENUM

Ceaucescu Addresses Meeting

AU281914 Bucharest AGERPRES in English 1906 GMT 28 Mar 86

/Text/ Bucharest AGERPRES 28 Mar 86--Friday, 28 March, President Nicolae Ceausescu presided over a plenary meeting of the SDUF /Socialist Democracy and Unity Front/ National Council that looked into the activity carried on by the front for safeguarding the peoples' peace and security, for making the international year of peace in the Socialist Republic of Romania.

During the proceedings many participants took the floor.

The speakers voiced the wish of peace, understanding and collaboration nurtured by the entire Romanian people, its unflinching will to work firmly for removing the danger of war, to implement disarmament, the nuclear disarmament in the first place, for the setting in of a climate of detente and security, for a policy of wide international collaboration based on the principles of fully equal rights, observance of the national independence and sovereignty, noninterference in the domestic affairs of other states.

After the debates the participants in the plenary meeting endorsed the program of the Socialist Democracy and Unity Front regarding the actions to be organized in Romania to mark the International Year of Peace.

The plenary meeting also endorsed the statement and call the Socialist Democracy and Unity Front of the Socialist Republic of Romania addressed to the democratic parties and organizations, to governments, to all the people in the European countries, in the United States of America and Canada and in other continents.

At the conclusion of proceedings Nicolae Ceausescu, general secretary of the Romanian Communist Party, president of the Socialist Republic of Romania, president of the Socialist Democracy and Unity Front, took the floor.

Appeal for Peace Adopted

AU282118 Bucharest AGERPRES in English 2006 GMT 28 Mar 86

/Article: "Declaration and Call"/

/Text/ Bucharest AGERPRES 28 Mar 86--In a declaration and call endorsed on 28 March 1986, the social Democracy and Unity Front (SDU) of the Socialist Republic of Romania addresses a ringing call to all parties and democratic organizations, governments and peoples in Europe, the United States and Canada, and on all continents to work for strengthening mutual collaboration and intensifying efforts toward safeguarding peace and achieving disarmament.

The document suggests that in the International Year of Peace action be taken for the elimination of intermediate-range missiles from Europe and other continents, of all nuclear and mass-destruction weapons, for the conclusion of a general agreement to ban nuclear tests, and for halting space militarization, while deeming peace above any other consideration.

The appeal also urges a substantial reduction of conventional arms, troops and military budgets, the liquidation of military bases stationed in the territories of other states, the withdrawal of the troops to within national frontiers, the creation of zones free of nuclear and chemical weapons in the Balkans, in northern and central Europe, in other parts of the world.

Advocating the actuation of the process of security-building and cooperation in Europe, of the building of a united Europe, the declaration and call stress the importance of a growing role and contribution of the United Nations to the ensurance of peace, to the peaceful settlement of disputes between states.

In conclusion to its declaration and call, the SDUF states its belief that by taking action in full unity, the peoples can stop the dangerous course of events to a nuclear catastrophe, ensuring the affirmation of the disarmament policy, of the nuclear disarmament policy first of all.

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BRIEFS

ETHIOPIA'S MENGISTU CABLES CEAUSESCU--To Comrade Nicolae Ceausescu, RCP secretary general and president of the SR of Romania. Flying over the territory of the SR of Romania, I would like to take this opportunity to convey best wishes to you, and through you, to the fraternal Romanian people. With the highest regard, Mengistu Haile Mariam, secretary general of the Workers' Party of Ethiopia Central Committee, chairman of the Provisional Military Administrative Council, and supreme commander of the Revolutionary Army of Socialist Ethiopia. /Text/ /Bucharest SCINTEIA in Romanian 8 Mar 86 p 5 AU/ 12228

CEAUSESCU'S MESSAGE TO SWEDEN--To Mr Ingvar Carlsson, chairman of the Social Democratic Labor Party /SAP/ of Sweden. Your election to the office as chairman of the SAP gives me the opportunity to extend to you cordial congratulations and best wishes for success in your activity of high responsibility devoted to promoting the Swedish working people's aspirations for progress. I express my belief that the relations of friendship and cooperation between the RCP and SAP will continue to develop in the mutual interest of our peoples and for the cause of international peace, detente, and cooperation. Nicolae Ceausescu, RCP secretary general. /Text/ /Bucharest SCINTEIA in Romanian 6 Mar 86 p 5 AU/ 12228

MPRP RELAYS MESSAGE OF THANKS--To the RCP Central Committee. Dear Comrades: The Central Committee of the Mongolian People's Revolutionary Party /MPRP/ extends cordial thanks to the RCP Central Committee for the warm greetings and best wishes extended to us on the occasion of the 65th anniversary of our party's creation. We express our belief that the relations of friendship and cooperation between our parties and peoples will continue to develop in the interest of strengthening the position of socialism in the world and of consolidating peace and security of peoples. The MPFP Central Committee extends to the RCP Central Committee, the Romanian communists and the fraternal Romanian people wishes for new and great successes in the activity of implementing the decisions of the 13th RCP Congress and in the struggle for peace and cooperation among people. The MPRP Central Committee. /Text/ /Bucharest SCINTEIA in Romanian 8 Mar 86 p 5 AU/ 12228

WORKER CONTROL CADRES MEETING--Bucharest AGERPRES 27 Mar 86--The proceedings of the third all-country meeting of worker control representatives took place in Romania's capital, on 27 March. An important event, in the country's socio-political life, manifestation of the democratism of the Romanian socialist system, the meeting gathered more than 1,000 participants--workers, foremen, technicians and engineers, farmers, other working people. The participants debated a report

on the organization and operation of worker control, measures for its further improvement. They endorsed a meeting's call addressed to the country's citizens and all factors with attributions in the organization and operation of worker control. In their addresses, the participants in the debates were highly appreciative of the Romanian Communist Party's steady policies for the extension and improvement of forms of citizens' democratic participation in managerial activities, including worker control, one of the most direct forms by which working people carry out their responsibilities as producers, owners and beneficiaries of social wealth. The speakers advanced numerous proposals to render the worker control ever more active in all fields of activity, to improve its quality. The participants addressed a letter to the Central Committee of the Romanian Communist Party, to the RCP general secretary, president of the Socialist Republic of Romania, chairman of the Socialist Democracy and Unity Front, Nicolae Ceausescu. /Text/ /Bucharest AGERPRES in English 1639 GMT 27 Mar 86 AU/ 12228

CEAUSESCU ADDRESSES YOUTH SCIENTIFIC SESSION--Bucharest AGERPRES 27 Mar 86--A 2-day annual scientific session of the Center for Research on Youth-related Questions on the theme "New Requirements of Youth Education for Their Participation in the Socioeconomic Development," opened in Bucharest, on 27 March. Nicolae Ceausescu, alternate member of the Executive Political Committee of the CC of the RCP, first secretary of the CC of the UCY /Union of Communist Youth/, delivered the opening speech. He underscored the significance of the 65th foundation anniversary of the Romanian Communist Party and pointed to the importance of the homeland's socioeconomic development programs for the current 5-year interval and beyond, until 2000, which provide a broad framework for every youngster's participation in socioeconomic development, plenary formation and assertion. /Text/ /Bucharest AGERPRES in English 1539 GMT 27 Mar 86 AU/ 12228

'GRAVE ACCIDENT' AT VULCAN MINE--Bucharest, AGERPRES 22 Mar 86--It is reported that a grave accident occurred at the Vulcan mine (Hunedoara County): an underground gas blowup killed 17 people and injured 2. Members of the party leadership and of the government went to the site of the accident. A party and state commission was set up to establish the cause of the accident and take every necessary step to remove its sequels. /Text/ /Bucharest AGERPRES in English 0900 GMT 22 Mar 86 AU/ 12228

TRADE UNION MEETINGS HELD--Bucharest, AGERPRES 1 Apr 86--In view of the forthcoming congress of Romanian trade unions, after the conference of county trade unions organizations and the conference of the Bucharest Municipality trade union organization, trade-union report and election conferences were held a few days ago by branches of activity. They analyzed the trade unions' activity for the organization and unfolding of socialist emulation in the respective sectors, their contribution to the country's general development in the last 5-year plan period as well as the tasks devolving on them in the current stage. The conferences elected the new committees of the 11 trade unions by fields of activity: metallurgy and machine building, mining, oil, geology and electric power, the chemical and petrochemical industry, construction, construction materials and woodworking, transport and telecommunications, light industry units, agriculture, forestry and the food industry, stage administrative units

and people's councils, trade, handicraft cooperatives and tourism, education, science, culture, printing, the press and publishing houses, health care units. Delegates to the General Trade Unions Confederation in Romania (GTUCR) congress were also elected and candidates were designated to the GTUCR Central Council. /Text/ /Bucharest AGERPRES 1 Apr 86 AU/ 12228

GIOSAN MEETS TURKISH PARLIAMENTARY DELEGATION--Bucharest, AGERPRES 1 Apr 86--A parliamentary delegation of the Republic of Turkey, led by Necmettin Karaduman, speaker of that country's Grand National Assembly, arrived in Bucharest on Tuesday, 1 April, for a visit to Romania upon the invitation of the Grand National Assembly (GNA). The same day, the GNA chairman, Nicolae Giosan, had an interview with the Turkish parliamentary delegation, when satisfaction was expressed between Romania and Turkey. Stress was laid on the contribution which parliaments and parliamentarians can make to boosting bilateral relations in fields of mutual interest. Emphasis was also placed on the wish to further step up the two parliaments' international cooperation, aimed at solving the problems that confront mankind, at establishing a climate of peace, security and understanding in the world. /Text/ /Bucharest AGERPRES in English 1819 GMT 1 Apr 86 AU/ 12228

YOUTH SCIENTIFIC MEETING ENDS--Bucharest AGERPRES 28 Mar 86--The proceedings of the annual scientific session of the Research Center for Youth Affairs, on "new youth-training requirements for its participation in economic and social development," concluded in Bucharest on Friday, 28 March. Either in a plenum or by sections, more than 150 papers were read during the 2-day meeting, outlining the RCP general secretary, Nicolae Ceausescu's original outlook on the young generation, its place and role in society. Debates also focused on topical questions of the youth's communist, revolutionary education, in the spirit of the country's economic and social development programs for the ongoing 5-year plan period and in a longer range, until the year 2000. An extensive interchange of information and experience was made on the session's theme and the participants set forth the conclusion reached by scientific research on the youth's value-minded orientations and socialist attitudes, school and professional training, the encouragement of technical and scientific creation, the youths' active and responsible participation in social life, the role the Union of Communist Youth plays in the worker democracy system, the involvement of research in approaching the basic problems of the young generation, the foundation of educative action on the conclusions reached by scientific investigation. /Text/ /Bucharest AGERPRES in English 1354 GMT 28 Mar 86 AU/ 12228

VISIT OF MOZAMBIQUE PRESIDENT--Bucharest AGERPRES 29 Mar 86--Invited by Romanian Communist Party General Secretary Nicolae Ceausescu, president of Romania, and by Mme Elena Ceausescu, Samora Moises Machel, president of the Frelimo Party, president of the People's Republic of Mozambique, and Mme Grace Machel will pay an official visit of friendship to Romania over 4-7 April 1986. /Text/ /Bucharest AGERPRES in English 1850 GMT 29 Mar 86 AU/ 12228

MINISTER PUNGAN MEETS WITH U.S. BUSINESSMEN--Bucharest, AGERPRES 31 Mar 86--On 31 March the Romanian foreign trade and international economic cooperation minister, Vasile Pungan, had an interview with a group of businessmen from the United States of America, led by George G. Gellert, "Atlanta Cooperation"

president and deputy chairman of the Romanian-American Economic Council, now visiting Romania. They approached aspects of the current stage of cooperative ties between Romanian foreign trade and U.S. companies, between Romania and the United States. /Text/ /Bucharest AGERPRES in English 1649 GMT 31 Mar 86 AU/ 12228

MONGOLIAN ARMY DAY MARKED--The minister of National Defense of the SR of Romania, Col Gen Vasile Milea sent a greetings cable to the minister of National Defense of the Mongolian People's Republic, Col Gen Jamsrangiyn Yondon on the occasion of the 65th anniversary of the Mongolian People's Republic Army Day. On 14 March a festive meeting was held at the Central Army House dedicated to the 65th anniversary of the Mongolian People's Republic Army Day. The meeting was attended by generals and officers of the Bucharest garrison. The meeting was opened by Lt Gen Gheorghe Gomoiu, deputy minister of National Defense. The ambassador extraordinary and plenipotentiary of the Mongolian People's Republic in the SR of Romania, Togoochiyin Genden, spoke about the significance of the celebrated event. In conclusion, the participants were shown a photographic exhibition presenting aspects in the life and activity of the soldiers of the Mongolian People's Army and a film provided by the Embassy of the Mongolian People's Republic in Bucharest. /Text/ /Bucharest SCINTEIA in Romanian 15 Mar 86 AU/ 12228

PAKISTANI CADETS CONCLUDE VISIT--Bucharest AGERPRES 26 Mar 86--The group of cadres and trainees of the National Defense College of the Islamic Republic of Pakistan who visited Romania over 22-26 March left Bucharest on 26 March. During their stay in Romania the guests were received at the National Defense Ministry, the Ministry of Foreign Affairs, the Stefan Gheorghiu Academy, visited the Military Academy, units of the Romanian Army and economic units and tourist spots. /Text/ /Bucharest AGERPRES in English 1915 GMT 26 Mar 86 AU/ 12228

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BIOGRAPHIC SKETCH OF VERSATILE ACADEMICIAN NORBERT KROO

Budapest NEPSZABADSAG in Hungarian 10 Jan 86 p 6

[Article by Pal Peto-Gabor: "To Take The Thing Seriously; Lines For a Portrait of a New Academician"]

[Text] If someone enters a place of work on completion of his university studies and has been working there without a break since then (because he worked in order to work for a total of 4 years, even in foreign research institutes), and if he is a director at the age of 51 and is elected into the ranks of corresponding members of the Academy, then we are inclined to hypothesize that his area of operations is narrow, that he "buried" himself in something and has been dealing only with that since. In the case of Norbert Kroo, however, this cannot be so simply because that place of work is the Central Physics Research Institute, in which quite varied research is taking place. But neither is he himself, with his engrossing work, inclined to be isolated or one-sided, which is also shown by the fact that he is a handyman ("Craftsmen rarely come in here," he says with perceptible self-esteem), reads poetry and prose in three languages in addition to Hungarian (partly for language practice) and attends concerts.

He brought his passion for tinkering from home. He was born in Csepel and his father was a cabinetmaker (member of a family of eight, all his brothers are outstanding skilled workers). The interested expert with clever hands would have liked to study but this was not given him, so he charged his sons with studying.

Only Excellent

"I felt that if my father made so many sacrifices then it was my obligation to study well," recalls Norbert Kroo. And he did; to the end he made only excellent marks, and in study competitions in mathematics and physics he placed so high that he was admitted to the university without an entrance examination. At that time the young people going to the university were "guided" and they wanted to make Norbert Kroo, for example, into a diplomat, but he was not inclined to even enter a second choice on his university application. He wanted a career in natural science. But he also liked literature, for example, and his secondary school graduation exam in Hungarian went so well that the chairman of the Hungarian department recommended a grade

of excellent and was sorry that he was not going on to study literature. He became a physicist, although actually he would have liked to be an engineer. He had felt the beauty of physics in his third year at the gymnazium; later, as a university student, he won a competition with a work for the science club and this further strengthened his decision.

He was an outstanding student at the university to the end, which required great effort especially in the first semester, but he did not give in. He took study seriously, as he took work later. He took everything he did seriously. Mornings he traveled in to the university, after lectures he studied in the library, evenings, as often as possible, he went to concerts. Even then J. S. Bach was his favorite composer. "There is enough of something romantic in him to suit my taste and temperament," he says, "but also it is truly mathematical music in its strict regularity. I feel that he has much in common with the natural sciences.... The fact that the same theme always returns, in a different version each time, I feel somewhat similar to my own work." Many other things interest him in addition to music, but it was primarily science that absorbed him.

"They were the happiest years of my life," he recalls his university period. "I studied a lot, but I was happy that I could study. And I could do it without material worries because I soon got a people's republic scholarship, which corresponded to good starting pay."

He laid the foundations for his life in another way at the university as well. One of his professors was Lenard Pal, who invited him to the KFKI [Central Physics Research Institute] after he obtained his diploma. Indeed, Pal picked his thesis subject, partly against his own desires. And one of his classmates, studying to be a teacher, became his wife.

"Lenard Pal became my boss," he says, "and I can say that he was a very hard boss, but since he was hardest with himself this only awakend respect for him. I learned to work from him and I learned how it was possible to switch quickly from one activity to another. When I went to the KFKI, in 1958, they were setting up the nuclear reactor, and of course everyone would have liked to work on it, myself as well. But up to then I had been doing classic solid body physics research. Beginning in 1960 I worked with neutron scatter and then in 1963-1964 I also worked with a nuclear reactor in Sweden on a scholarship from the International Nuclear Energy Agency. I wrote my candidate's thesis on the results of my work there and defended the thesis in 1965. Then, since I was still making excellent marks, I was made a doctor at the Lorand Eotvos Science University with the gold ring of the People's Republic."

The Dubna School

He was always an experimental physicist and always worked on tasks requiring much work. In 1968 he was invited to Dubna, to the United Nuclear Research Institute of the socialist countries, where he was a deputy director along with Nobel Prize winning academician Frank. This was also a good school in the area of science guidance--and not a bad language school either. He studied in Russian at the school--and he could do so too, in contrast to most of the students. What was his secret? It is getting boring to write it down, he took

the study seriously. He had learned English during his university years, with a private tutor, and German, alone, from books and newspapers. At Dubna he had an opportunity to practice the languages; in addition to the Soviet researchers those of other nationalities also worked at the institute, and he was responsible for international contacts in addition, so then, almost every day, he spoke, wrote or sent cables in "every" language by turns.

Upon his return home there was an unexpected sharp turn in his career, he had to take over leadership of the section dealing with lasers at the KFKI, and this is what the statement recommending his Academy membership calls "the second half of his career," noting that his research extends to development of lasers and their practical applications.

"Then, along the way, I learned virtually everything about lasers," he says now. It could not have been easy to switch from basic research in solid body physics to this area, requiring different information in many respects, but he feels that he did not entirely leave the old but rather alloyed quantum electronics and solid body physics, and this was fruitful, in his own professional work and in the area of basic and applied research, for example with his colleagues he developed 14 inventions in addition to the scientific publications. Hungarian industry took over some of the inventions, the KFKI uses others, and now they are talking about foreign sale of a few licenses.

Laser research is taking place around the world, and naturally with greater material possibilities than in Hungary. Still, with his colleagues he has achieved results in connection with gas lasers, among others, which the international professional press has received with great recognition. The same can be said of his research connected with solid body lasers. The statement recommending his Academy membership puts it this way: "Under his guidance they developed solid body lasers with parameters which are unique in the world. He was the first, or among the first, in the world to recognize the possibility of using metal oxide-metal tunnel diodes as a coherent and incoherent light source, and to recognize the theoretical and practical significance of the great so-called optical non-linearity arising in small laser regions in liquid crystal materials."

To Lead And To Research

For years now Norbert Kroo has been director of the Solid Body Physics Institute of the KFKI.

"I consider myself primarily a scientific leader," he confesses. "I feel right about myself if I am at home in the themes being cultivated and can add something professionally to the work of my colleagues. A leader must maintain close contact with the scientific work, partly because in this way he can make decisions courageously and does not have to fear for his position, because in case of conflicts he can return at any time to research. In my opinion leadership in the area of research must be democratic; it must be recognized that there are those who know more about a given theme than the leader does. But once a decision is made then it must be carried out with determination."

How does a scientific leader see the situation of science today?

"I consider it a mistake," he says, "to save on science when we have economic difficulties. It is just in such periods that we should lean on the development of research more so that with the passing of the economic difficulties we can continue productive work at a higher level on the basis of the achievements made in the meantime. This is what is happening in the developed countries today.

"If they make someone a leader they should trust him as long as he is there and not take from his spirit for his work with petty supervision and bureaucratic tasks. Such guidance of science is clumsy and expensive. If they do not trust someone they should remove him. But as long as he is there and is entrusted with an institution, instruments, etc. worth perhaps many hundred millions of forints then why must every little thing be justified with papers? For example, I do not like administrative work, even if it is necessary, because I could do more useful work in that time. Anyway, I have a dissatisfied nature," he says about himself, "I always feel that I never carry out my task in the way and at the level imagined by me."

In addition to leadership he can lay claim to very many scientific accomplishments. The number of his publications is about 150, recognized and highly esteeemed by international professional public opinion. He has given 156 scientific lectures since 1968, 78 of these at international conferences and 50 in foreign institutions. He is an invited scientific adviser for a number of foreign institutes. He has written four books and is co-author of six OMFB [National Technical Development Committee] studies. He was chairman of five international conferences and an invited speaker at many. There is not room to list how many committees he is a member of; he was first secretary of the Lorand Eotvos Physics Society until the recent past, when he was elected president. He is deputy first secretary of the European Physics Society. In addition to all this he is a titular professor at the Lorand Eotvos Science University.

He likes and understands the arts. Surely many will recall the exhibit, which aroused a sensation, at which, in cooperation with Attila Csaji, a graphic artist with kindred views, he produced a charming and tasteful spectacle using the refraction and reflection of laser light; this exhibit from the National Gallery traveled to Helsinki, Copenhagen, Vienna and Paris after visiting a number of Hungarian cities. So it is not without cause that he says with perceptible emotion: "Natural science, and especially basic research, belong to human culture in the same way as the human sciences, and the cultivators of them should be mutually understanding of at least the basic concepts. The view opposed to this, widespread here, is very unhealthy. It is another question that in addition science also influences the material foundations of society--this is its special advantage and merit. Scientific thinking is disciplined thinking, and for this reason also science has a social role, because it educates those having contact with it to such thinking."

The Background of Accomplishment

One of the pillars supporting his great amount of work is a solid and stable family background. His wife, who is a gymnazium teacher specializing in

mathematics and physics, is his great support; when he defended his work submitted for the degree of doctor of physical sciences, at the age of barely 34 years, a famous scientist who knew his work well congratulated--his wife. And everyone felt that he did so with good reason. In addition his wife teaches her own subjects--let us admit, they are not such popular subjects--in such a way that her students come back to see her even after a long time.

His life is science--which he always took seriously.

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PLANNING, DIRECTION OF SCIENTIFIC-TECHNICAL PROGRESS

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[Article by Lajos Faluvegi, deputy premier and chairman of the National Planning Office: "Planning and Direction of Scientific-Technical Progress in Hungary." An introductory note observes that this article was prepared within the framework of cooperation among the plan theory journals of the CEMA countries and will appear in all participating journals.]

[Text] It is the common aspiration of the CEMA countries to become capable of realizing their social goals at an ever higher level. There is also a common recognition that a crucial condition for this is an acceleration of scientific and technical progress and an ever fuller utilization of the achievements of technical-scientific development in the entire process of social renewed production. There cannot be and there is no other standard for the community of CEMA countries and, naturally, for each individual member country than the leading scientific and technical performance of our age.

The tangible achievements of the manifold cooperation among CEMA member countries prove that with a rational division of labor and a uniting of creative intellectual forces new possibilities for economic development are opening up for the peoples building socialism. A stand based on this was taken by the high level conference of party and state leaders of CEMA countries in Moscow in 1984 and by a 1985 conference of the Central Committee secretaries dealing with economic policy questions when it was pointed out that a turning-point must be achieved in the intensification of the economies of the member countries--posting the goal of a broad application of the most developed technical achievements.

In our country as well, scientific-technical progress and the cooperation of the CEMA countries are the driving forces for socialist development. An epochal change has taken place in our country in the past 40 years. Our scientific and technical development base has grown to many times what it was in personnel and in accomplishment. The conditions for making use of technical-scientific achievements have been created. In a rather broad area we could begin to catch up to the leading international trends.

But in the 1970's the Hungarian economy could not keep up with the accelerated pace of scientific-technical progress and, simultaneously, it suffered a

significant deterioration in the terms of trade as a result of the energy and raw material price explosion which took place on the world market. All this made it urgent that our people's economy adjust structurally to the very important changes which had taken place. And because this process developed only after a delay and at an unsatisfactory pace the external balance of the people's economy broke down. But when the economic policy and economic guidance preconditions for the structural accomodation had been created at the end of the 1970's there was a repeated deterioration of world market conditions (the second oil price explosion and the international debt crisis) creating an emergency situation in which we had to concentrate our efforts and our resources primarily on restoring and consolidating the external economic balance. For this reason fewer resources than intended or needed went to modernization and technical development, but without these things an acceleration of the transformation of the production and product structure and a real strengthening of the efficiency of management could hardly be achieved.

So in the years ahead our most important task is to break out of this circle and vitalize the development of the Hungarian economy. This was one of the central thoughts of the 13th congress of the MSZMP and the resolution of the congress put this task before us. The resolution also posed the task of exploiting more efficiently the advantages of the international division of labor--in order to accelerate technical development too--in our foreign economic contacts, primarily by a further development of cooperation with the CEMA countries.

The CEMA countries--our country among them--set about 2 years ago to coordinate their plan thinking for the years 1986-1990. In the course of this we could find that the friendly countries are unanimously striving to stimulate their economic growth and the technical development which aids it. To do this they are seeking--together with internal factors--for the stimulating forces which can be derived from making cooperation broader and deeper.

While we were laying the foundations for the economic cooperation of the next 5 years we began, in the spirit of the high level economic conference, a coordination of the economic policies of our countries over a longer run in respect to international cooperation. We are looking for new possibilities for developments of common interest pointing in strategic directions and for efficient forms for realizing them. Within the framework of this work we have prepared long-range common technical development programs--embracing 15-20 years--which will provide a sure base for the fuel and raw material supplies of our countries, develop and introduce at key points of production technologies and techniques at the world level which are also rationally conservative, increase in a modern way the production of foodstuffs and industrial consumer goods and adjust transport capacity to the ever increasing needs. So our activity is imbued with a striving for complexity--our goal is to strengthen the integrated chain of research and development, investment and production, marketing and supply, attending to the possibilities of international cooperation, and we will contribute to the realization of this task with our Hungarian accomplishments. It must be seen, however, that the technical development potential of the socialist countries and the limited nature of the developmental resources do not make it possible for them to

reach the front rank of scientific-technical progress in every area in one or two plan periods. In the years ahead the efforts of our country will be directed at seeing that the so-called technological gap does not open wider and that at a few well selected points we should come closer to the highest level.

Because of the openness and relatively small size of our economy our country is especially dependent on seeking the driving forces for scientific-technical progress in the international division of labor, primarily in cooperation with the socialist countries. The long-range agreements between Hungary and the other socialist countries concerning the development of economic and scientific-technical cooperation provide aid for this. We have already signed long-range bilateral programs pertaining to this with the Soviet Union and the German Democratic Republic and agreements to be signed with the other CEMA countries--built on the given circumstances of the partners--are being worked out. Within the framework of the programs there will be a harmonization of the most important areas of economic and scientific-technical cooperation in questions considered to be of mutual interest and sector subprograms serving this goal will be worked out. These programs and cooperation forms will help us to concentrate domestic forces more effectively on the solution of emphasized points in the area of scientific research and technical development, making use in this of the achievements of our partners, and we will be able to contribute effectively with our experiences to the research and development undertaken by our partners.

The rich and useful experiences we have acquired in the area of technical-scientific cooperation prove unambiguously that direct contacts between the research institutes and enterprises of the CEMA member countries represent an efficient and extraordinarily fruitful form for accelerating technical-scientific progress and practical use of the results. For this reason it would be justified to put more technical-scientific cooperation on a contract basis--more directly and more many-sidedly--because this might help create a closer link between research, production and marketing, provide an economic incentive to research to solve practical tasks, accelerate the introduction of scientific achievements and in general aid a better and faster accomodation to needs. One would have to regulate in the contracts the mutual obligations connected with performing the work and utilizing the results and, among other things, place the transfer of licenses and know-how among each other on a basis of material interest. Special care would have to be turned to a further expansion of direct research and technical development cooperation among enterprises.

Since strengthening the forms of integration contacts indicated above is a common interest of the CEMA countries we will continue to take the position that the economic guidance system should create suitable conditions for an expansion of direct contacts among managing organizations. In the course of the coordination of national economic plans now taking place we are already turning greater attention, in the economic and technical-scientific work groups of branch organs, to selecting areas for direct contacts and we regularly inform the managing organizations about those enterprise and technical development organizations in other CEMA countries which have

received authorization to establish such contacts in certain areas. Following the conclusion of the 5-year plan coordination we will evaluate the experiences and make recommendations concerning in what additional areas it would be useful to aid an expansion of direct technical, production and trade contacts with the tools of interstate cooperation as well, making them more effective.

In our country economic guidance intends to aid an acceleration of scientific-technical progress with three basic tools:

--Long-range planning of the people's economy will provide the basic orientation for designating our tasks connected with scientific-technical progress.

--In the medium-range national economic plan we will set down key points for technical development and will sum up the pertinent tasks in concrete programs.

--We will move the enterprises toward the designated directions and tasks with the tools of economic guidance as well, primarily by increasing the general material interest in technical development.

A large part of the socioeconomic processes can be guided only over the long term. Similarly, achieving certain scientific results requires much time. Thus within the framework of long-range planning we will strive, with scientific care and in a complex way, to discover the lasting trends of progress and the long-term consequences of our present actions. With the passage of time we will again and again compare the results of long-range planning with the interational and domestic trends of socioeconomic development. A systematic, continual analysis of the long-term development of the world economic environment and our internal conditions has confirmed the determining significance of an acceleration of scientific-technical progress from the viewpoint of realizing our socioeconomic goals and has helped to designate the points of emphasis for domestic scientific research and technical development work.

General international experiences show that in our age the most effective, most important factor in the modernization of production is the development of technologies. Considering the given conditions of the Hungarian economy, the level of development it has achieved and the conditions for further progress we should concentrate our efforts on such lasting and promising trends of technologies development as, for example, the development and introduction of technologies aiding the economical use (conservation) of material and energy and use of waste and secondary raw materials, a broad spread of the use of electronics and development of microelectronic technologies and the development and application of biotechnologies.

Today the first two developmental trends so pervade every area of production throughout the world that without progress in these and without making use of the results being born one cannot imagine competitive production or an improvement in efficiency. This effect has not evolved to this degree in regard to biotechnologies, but the trend points toward the development of

similar interdependencies. Developmental work in this area provides a foundation for the economic development of the more distant future as well as results which can be used in the near future.

Points of Emphasis for Scientific-Technical Development in Medium-Range National Economic Planning

A fundamental question of the 5-year planning work now underway, a question determining the balance and growth prescriptions, is: How can the comprehensive developmental trends discovered by long-range planning be translated into the language of economic action? In the course of preparing our 5-year national economic plan for the years 1986-1990 we tried to find, with more basic work then ever before, those areas of the economy and of the life of society where the greatest results could be expected from the practical application of the developmental trends.

The law concerning the 5-year plan for the people's economy will summarize the economic policy and chief goals for the plan period and the system of tools for implementation. Adoption of the plan law has been preceded by a long process, almost 3 years of planning work. The goals were given form in this work, from the development of the economic policy ideas through the working out of the plan conception to the formulation of the plan proposal, on the basis of ever richer information, international plan coordination and the harmonization of social interests at various levels. In the course of this work analyses were prepared about world economic processes and the factors for internal socioeconomic development, technical-economic studies and conceptions were worked out for the most important areas of the producing sphere and then the parts of the economic policy conception and so-called block conceptions examining the developmental possibilities of the producing branches were prepared. The work embodied in these analyses and the various part conceptions, in addition to being indispensable for a more precise determination of the ratios and goals of the national economic plan, created the possibility for economic guidance and the enterprises to prepare for execution of the 5-year plan, to think through those decision situations and choice points with which they may meet in the plan period and to prepare the tools for implementing the plan.

Thus every element of national economic planning serves to bring scientific-technical progress to bear in socioeconomic practice, but this is the express task of some planning tools.

One of the parts of the economic policy conception laying the foundations for the 5-year plan is the technical development policy conception which, building on the conclusions of the long-range planning work, on the chief international trends of scientific-technical development and on the interdependencies discovered in the technical-economic conceptions of various specialities, designates the chief direction for the technical development of the economy. Taking into consideration the developmental level and structural peculiarities of the Hungarian economy the infrastructure has special significance. Today, among the elements of the infrastructure, a development of telecommunications and building up the material-intellectual base for technical development may be the steps which would contribute broadly to a better unfolding of the

efficiency improving effects of technical development. Together with a technical development policy conception we have prepared a conception for a medium-range plan for scientific research which has recommended stressed tasks in those areas in the natural sciences and technical sciences, and has defined concentrated state support for them, which account for the chief directions of technical development (thus, for example, material sciences research to support microelectronic technologies and the economical use of material and energy, reducing the losses in energy production and use, etc.). The national medium-range research and development plan is being prepared on the basis of these two parts of the economic policy conception--taking into consideration the additional interdependencies and more precise tasks discovered during planning.

We have worked out so-called branch block conceptions as a foundation for the Seventh 5-Year Economic Plan. Building on the conclusions of the cited conceptions for technical-scientific development these seek an answer, in regard to industry, the foodstuffs econmy, the construction industry and the productive infrastructure, including their branches, as to which areas should get greater material-intellectual resources in proportion to their tasks. Thus, for example, within the framework of the industrial block conception we plan the optimal ratio for the extracting and processing industries or the key points for machine industry structual change, those areas where we must achieve more vigorous development and where uneconomical activities must be made profitable or phased out.

The cited block conceptions designate not only the directions for structural modernization and technical development of branches within blocks but also the developmental tasks for areas which affect one another. Planning within blocks makes it possible to circumscribe better than before those activities where the highest level can and must be attained, where it would be useful to realize a so-called following developmental strategy and, finally, where it is useful to prescribe a simple maintenance of level. Looking at the branches, special sectors and chief activities together we can best approximate harmonic development. In the course of working out the medium-range economic plan we also prepare programs organizing execution of the most important tasks of economic development, closely coordinated with one another and with other elements of the system of goals and means of the plan. We use two types of these programs in our planning system. We formulate the tasks for technical development and a transformation of the production structure which embrace several producing branches and affect broad areas of social life in the so-called central economic development programs while processes significant for the modernization of production but conceivable largely within the framework of a single branch are formulated in so-called action programs.

A central economic development program provides a framework for developmental actions the successful realization of which presumes the concentrated use of intellectual and material resources existing in various areas of the people's economy, a purposeful development of our participation in the international division of labor and the organizing, coordinating activity of central economic guidance to encourage this.

The program worked out for the coming plan period for our social-economic use of electronics is a good example of such a comprehensive modernization undertaking of economic policy. As the name of the program shows we will turn our attention primarily to those changes which the use of electronic devices and methods can bring in various areas of society and the economy, thus in the modernization of industrial products, in the guidance of the production process, in the flow of economic and other information, in the administration of society and in keeping track of social processes. As a result of carrying out this program we want to make the microelectronic culture an organic part of socioeconomic activity. Preparing the generation now growing up and the experts already working for a many-sided use of electronics is an important part of the program.

Another central economic development program is directed at a further development of the manufacture of pharmaceuticals, crop protection materials and intermediaries. This program is justified by the existing manufacturing traditions and the results achieved with a high level intellectual base. The goal is to increase the ratio of original preparations in this area and thus, in addition to improving domestic supply, to consolidate or increase our presence on external markets.

Another approach to economic development tasks is made up of those central conservation and modernization programs which are intended to aid conservation and more economical use of materials and energy and use of byproducts and wastes, primarily by the development of production technologies. In the course of working out these programs a broad circle of experts surveyed with very basic work the conservation measures and development actions promising the greatest results in the economy, studying the sort of investments with which these things could be realized, the conditions for building an interest in implementation, what results could be expected directly at the enterprises realizing the several developmental actions and what economic ripple effects might be expected from the measures. These programs are important tools for basing the plan calculations pertaining to the development of material and energy use and the efficiency level of management. They offer aid to the enterprises in planning such developments and provide a basis for the organizing-coordinating work of state economic guidance connected with this and for developing incentives supporting the development.

We are working out action programs in those cases where central economic guidance aids, with coordinated organizing work and purposeful supports for these programs, the actions aimed at development or expansion of modern and competitive production in some area of production which are started basically on enterprise initiative. Such programs have been prepared for those areas in which a swift development is desirable in the plan period but where broad domestic experience and suitable production bases are not available and where the requirements for dynamic development and a transformation of the production structure cannot be seen precisely by the enterprises. For example, such programs were prepared for the spread of the use of robot technology and for the development of manufacture of such technology, for laying the foundations for the manufacture of video technology products and a broad spread of the use of such products and for research on or broader use of certain areas of biotechnology.

As can be seen from this description of the programs--giving examples and not a complete description--planning is approaching in a variety of ways the spread in the economy of the ruling currents of scientific-technical progress. For example, the use of electronics in products and in the control of production processes is one way, possibly the most effective way, to reduce specific material and energy expenditures. The action programs for the development of robot technology and video technology designate those product groups in which the use of electronics constitutes the essence of development but at the same time we expect additional favorable economic and social effects from the use of the modern products created.

It is a peculiarity of our programs that they determine the direction of development, the character of the state economic guidance work aiding this and the types of tools to be used, but they do not end with approval of the national economic plan and of the documents formulating the programs. The several programs can be expanded during the plan period with newer and newer effective actions corresponding to the basic goals of the program. The tools for implementation are aimed at bringing more and more enterprises into realization of the program--an even broader sphere in the case of the programs of an applications character.

Care must be taken to implement the programs making use of tools which fit the character of the entire economic guidance system, creating an interest on the part of the enterprises and making use of state economic organizing work. This includes informing the enterprises about the goals of the program and about concrete actions prepared as examples, it includes credits and state supports offered for enterprise developments and it includes tax policy.

There is a systematic and mutual information link between national economic planning and the enterprises in regard to the central economic development programs. The programs are prepared with the direct participation of the most interested enterprises. The initiatives and proposals of the enterprises--judged from the viewpoint of the general goals of the program and coordinated--receive a place in the program or in the planning documents serving as a basis for the program.

Both the preparatory materials having suitable information value and the approved programs are at the disposal of the enterprises and on the basis of these they can judge what sort of economic actions and developments they can count on various forms of state support for and, in addition, what sort of actions are being prepared in other areas of the economy which offer cooperation possibilities or influence the production background or marketing possibilities of the several enterprises.

The Technical Development Goals in National Economic and Enterprise Planning

In order to accelerate scientific-technical progress there is a need not only for us to develop appropriate programs within the framework of national economic planning work but also for there to be a mechanism of the economy

which will encourage or even force the enterprises to technical development by means of collective and individual interest produced by the economic regulators.

An interest in technical development which continually adjusts to market needs and which is rooted in the entire system of enterprise management is a precondition not only for a continual improvement of the general technical culture of the economy but also for the efficient realization of individual stressed developmental tasks supported by various state measures. For this very reason, when Hungarian economic policy posted the goal of having the intensive aspects of economic development become the determining ones in the coming period, it regarded as the starting point a substantial strengthening of a constraint forcing efficient management and technical development on the enterprises, with a further development of the entire system of economic guidance and a further transformation of the economic environment for enterprise management. We are in an intermediate stage of this process. The steps taken in 1985 will be followed by others in the years ahead.

By giving life to competition among enterprises we want to strengthen the motive forces of the economic environment which force efficient management. To realize this a transformation of the enterprise structure, overcentralized in comparison to the conditions of the Hungarian economy, has begun already.

A large number of the managing organizations can generate a technical development fund on the basis of their own decision and of a size determined by them--which can be managed as a fund--which can be accounted for as a cost, tax free. Such funds must be generated as an obligation only by research intensive machine industry and chemical industry enterprises under ministerial supervision on the basis of centrally determined keys. The prescribed keys represent a minimum for them and they can be raised by an enterprise decision.

If the technical development fund obligatorily prescribed or generated on the basis of their own decision does not offer cover for the technical development expenditures or if the enterprise decides not to include the technical development cost fraction in the price of their products then the actual expenditures of the technical development activity can be financed under the heading of a cost. There is no obligatorily prescribed upper limit to technical development expenditures, the sum which can be turned to this can always be determined as a function of economicalness.

It is our intention that the value judgment of the users should be increasingly realized in the situation of the enterprises, in their income relationships. For this reason we want to create, for example, legal and organizational conditions so that the assets of those enterprises which cannot meet the economic requirements should be transferred into the hands of enterprises managing more efficiently.

This leads to the recognition that one of the elementary conditions for animating technical development is to improve the mobility of the economy, its ability to be constantly transformed. For this reason it is our aspiration, going beyond the already existing legal possibilities and channels for transferring enterprise and bank financial assets, to provide incentives for

the regrouping of assets which will strengthen interest in releasing enterprise resources working with unsatisfactory efficiency and investing them in efficient undertakings with good prospects.

Providing credit is an effective conduit and stimulus for the modernization of production in all those cases where the developmental actions are effective in themselves, where implementing them is in the interest of the enterprise and where the credit supplements the enterprise's own resources. In cases where the useful effect of some developmental action lies partly beyond the effective sphere of the interest of the given enterprise and appears in other areas of the people's economy then a fund award and/or a tax concession offered from state sources could be the tool to strengthen enterprise interest and encourage modernization.

In regard to other forms of credit and financial support it is the task of state economic guidance to develop new practices more effective than heretofore. Since we must continue to carry out the modernization of the economy at an investment rate a good bit lower than was customary in past decades economic guidance must assist in seeing that insofar as possible every developmental action of the enterprises serves the quality and technical development goals of the plan. For this reason we are developing a financing practice in which it becomes a basic requirement for awarding bank credit that the production created by the supported enterprise investment conserves and makes effective use of materials and energy, results in products which can be sold competitively on external markets and does not pollute the environment.

We make the plan priorities effective by offering credit and support to those enterprise developments which satisfy the requirements of the national economic plan in a complex way. Such a support practice is a good example and with the force of positive experiences in developmental work it also has an effect on the technical content of and market justification for investments being realized strictly from enterprise resources.

We are also gradually creating conditions for a uniform financing of the innovation process. In recent years so-called innovation financial institutions have been formed for this purpose. The initial resources for these have been created in part by segregating a part of the financial assets of large banks dealing with the financing of enterprises and state investments and in part by regrouping a part of the state financial assets serving to support technical development. Undertaking a good bit greater risk than is customary these financial institutions offer credit for the development of technical novelties, for investments serving the practical realization of them and for the material costs serving marketing and market expansion. In case of need they also help their clients with advice and by organizing the innovation process. Their share in the financing of development is still quite small and they participate mostly in carrying out smaller volume actions. We intend to expand further this path for investing economic development resources.

The changes in the enterprise tax system carried out in recent years and planned for the future are gradually bringing the enterprise costs for live work closer to the social costs of reproducing the labor force. We expect that this will increase the interest of the enterprises in increasing the

productivity of labor by using modern technical tools and this will make the utilization of live work more economical in the people's economy as a whole.

One of the basic questions in stimulating technical development is the time horizon of enterprise interest. Elements of short-term interest dominated in the enterprise interest system used thus far. In the course of the further development of our economic guidance system we took significant steps to extend the time horizon of interest by strengthening the stable elements of income regulation, by eliminating in many areas an evaluation of performance relative to a base and by a substantial relaxation of the internal restrictions in managing enterprise assets. The theoretical model developed for this promises a gradual strengthening of ownership behavior by the enterprise collective and thus the development of an institutional long-term interest serving technical development.

We intend to aid a resolution of the conflicts of interest holding back a faster utilization and practical application of research and development being done on enterprise initiative by transforming the organizational links of the division of labor between research and development and production. In recent years several dozen technical development and consulting enterprises have been formed partly out of research and development institutes and partly out of other organizations. In these enterprises the internal regulation of management corresponds to the peculiarities of the technical development process and the basis for their interest is to share directly in the extra profit which the enterprises taking over and using the research and development achievements derive therefrom.

Our economic regulations also make it possible to make even broader use of technical novelties by forming small enterprises, small cooperatives and economic work associations. The individual risk of such--smaller size--undertakings is relatively great, but the social risk is small because they can be started with a good bit smaller investment compared to the average enterprise size and if they fail they can be quickly liquidated. On the other hand, if the market recognizes the technical novelty and the production expenditures then these smaller undertakings can start to grow.

A basic element in the system of conditions for scientific-technical progress is the so-called human factor: the general culture of people, their professional knowledge, the general level of the work culture, discipline, an aspiration for the systematic renewal of production, and accepting the changes which go with this. The system of education and professional training and support for general culture should serve progress. It is not possible to speak in detail of these things here. But it must be pointed out that making increased use of the intellectual capacities of people also requires creating a greater interest in greater performance and in the systematic renewal of production. We want to make a turn in the better moral and material recognition of creative technical work. We are convinced, however, that even this policy intention can be truly realized only if systematic technical development becomes an everyday need for the enterprises.

Our planning and economic guidance tools and methods serving to accelerate scientific-technical progress in our people's economy are constantly changing. We are trying to learn from our own achievments and errors and to make use of the international experiences which can be fitted into our economic guidance system. We turn with interest to the experiences of the CEMA countries working to realize the common goals and we are ready to share our own experiences with them.

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DEVELOPMENT OF UNIMERIC CNC EQUIPMENT FOR MACHINE TOOL CONTROL

Budapest GEP in Hungarian No 8, Aug 85 pp 286-290

[Article by Gyorgy Barat, of VILATI: "Development of the UNIMERIC CNC Machine Tool Control Equipment at VILATI"]

[Text] For 25 years VILATI [Electric Automation Institute] has been dealing with development and manufacture of machine tool control equipment. Today our equipment can be found in virtually every machine factory and we are able to satisfy the needs of our customers at an ever higher level.

We began development of the UNIMERIC CNC in 1976. The essence of our conception was that we would not develop a special purpose machine but rather a module system from which a variety of equipment could be assembled and which would be suitable for broad applications in the area of industrial automation. We were also forced to do so in order to better exploit manufacturing capacity for in this way the elements of our system could be made in larger series. The correctness of our systems thinking is shown by the fact that in addition to the UNIMERIC CNC we used the same elements to make control equipment for the CARTIMAT plotting board (Carl Zeiss Jena), control equipment for astronomical telescopes also manufactured by Zeiss and the UNIPROG microcomputer, which makes possible automation of CNC programming.

We were striving to build a system operating under the supervision of a universal microcomputer with the aid of general purpose tools so that the execution of differing tasks would be primarily a question of program design.

Figure 1 shows a block diagram of our system. It can be seen that a single bus system links the elements, all modules are connected to this bus, all data transmission among the modules takes place through it, we do not use any other connection between two modules. Our modules are functionally independent, each is capable of executing some task by itself, under the supervision of the central unit.

In practice this theoretical structure means one card one function. Since we also adhered strictly to the modularity principle in building up our software system the various configurations mean plugging one card each into the rack and compiling the appropriate software system.

Consistent adherence to this simple principle also resulted in the advantage that the development of the several modules can take place independently of one another, thus over the years we have constantly expanded the range of modules which can be used and could modernize the elements as necessary. Thus the continual development and manufacture hardly caused difficulty, we could follow the needs of the market, and thanks to this the unchanged system, repeatedly renovated, is modern even today.

In earlier versions of our system we used only a single microprocessor. Today we entrust more and more tasks to separate processors, for example PLI, control of the display, floating point arithmetic and the floppy controller. Thus the several modules--subsystems--solve their tasks at an ever higher level, which naturally raises the level of the services of the entire system.

Our solution does not make it possible for us to be competitive in price with the cheapest (low-cost) category of CNC equipment. We try to compensate for this with services which can also satisfy the requirements of the most complex processing centers.

The Control Cycle

The most important task of CNC systems is control of the moving axes of machine tools. The control cycle measures the momentary position of the axis, receives the momentary value of the path calculated by the CNC central unit, and controls the motors via the drive. Figure 2 shows the elements of the control cycle and a simplified model of it.

The UNIMERIC CNC solves the task of control in the software. Processing the measured data, calculating the control algorithm and control of the digital-analog converter are all tasks written into the program. Thus it is possible for us to correct the measured data when this is necessary, to develop the control algorithm and to modify the measurement and control resolution capacity. Today the UNIMERIC CNC is capable of controlling six axes. These can be continual or indexed, linear or turning axes. We also solved control of moving portals equipped with two independent motors and drives. Today the CNC is capable of accepting virtually every measurement transmitter used in the machine industry, for example impulse transmitter, optical measurement scale, resolver and induction tone.

Measurement and Mechanical Precision

The machine industry is making ever higher precision requirements of modern control equipment. For this reason we realized in the UNIMERIC CNC services which make it possible for the mechanical precision of the machine to be exploited, that is the machine-CNC system is capable of manufacturing parts as precise or more precise than the machine tool itself. The CNC does this with a compensation for the systematic errors of the machine.

In the interest of solving the task the machine manufacturers can do much also by using direct measurement systems ever more frequently (that is, systems which do not measure the movement of the motors but rather the actual movements), for example induction tone or optical scale. The CNC makes

possible the use of measuring elements with a resolution of 0.5 microns, the programming unit is one micron and the precision of computations is also one micron. We have also begun development of a system in which the unit of programming and computation will be 0.01 microns.

In order to reduce the imprecisions of the machine tools we introduced compensation of change of direction errors; this modifies by an average value per axis the magnitudes indicated by the measurement system for every change of movement direction, including quarter cycle changes.

The UNIMERIC CNC is capable of compensating measurement errors along the axes. If the repeat precision of the measurement elements is better than the measurement precision then we can set the machine with a high precision measurement device--for example a laser device--and store the necessary corrections in the CNC in a table with a maximum of 1,000 elements. Between two measurement points the CNC approximates the error curve "along the straight."

We also worked out a method which corrects the effect of the "carrying" axis on the "carried" axis. This correction will be introduced this year. This will make it possible to reduce errors which derive, for example, from the fact that due to the right angle error of the Z axis carrying a Y axis the movement of the Z axis causes movement in the Y direction.

The CNC and Machine Tool Interface

Linking the measurement systems and the drives is the task of the control cycle. Solving other functions takes place via a logical interface.

The UNIMERIC CNC is capable of solving this task at two different levels. In simpler cases we use a PLI unit (programmable logical interface) which is capable of controlling 56 outputs and receiving 32 inputs. The user determines the control algorithm and VILATI builds it into the internal programs of the CNC.

If the number of outputs and inputs is substantially greater then we use a PLC module (programmable logical controller) in the CNC. This unit can receive 256 inputs and can control 256 outputs. The user can program the unit in a high level language with the aid of a separate developmental system. Twenty K bytes of memory (RAM/EPROM) are available for the user program.

Programming the CNC

The size of the present article does not permit us to deal in detail with programming questions, but we will describe a few basic principles.

Hungarian and international standards define the bases for programming; the UNIMERIC CNC satisfies these standards perfectly.

In every case the units for programming are natural measurement dimensions:

--geometric dimensions, microns or millimeters,
--feeding speed, mm/min,
--revolution numbers, 1/min, etc.

The geometry of the part must be given in the programs; computing the tool paths necessary for processing is the task of the CNC. In the course of preparing the parts program the person preparing the program does not have to know the dimensions of the tools; these are entered into the CNC when the program is run. In principal planes the CNC is capable of computing the paths (G41, G42) from the tool dimensions completely automatically; in the course of three-dimensional movements the operation is semi-automatic.

Preparation of programs is aided by a service of the CNC whereby the programmer can take any point on the piece as the starting point for the coordinate system; indeed, he can select eight null points in one program or can shift the null point in any direction.

It is not necessary to write a separate program if one detail on a piece is a mirror image of another detail. The CNC can "mirror" the program for any main axis (X, Y, Z).

Computer Technology Services

In the first phase of CNC development it was not yet obvious what advantages would arise if the equipment operated under the supervision of a microprocessor central unit which could be freely programmed by us. The first CNC versions could do nothing more than the earlier NC equipment, each task of which was realized by special purpose circuits.

Using methods already tried out in computer technology brought a leap in the development of NC technology.

Memories with ever greater capacity were the first to appear. Today there is a 128 K byte RAM area in the UNIMERIC CNC to store parts programs (this is equivalent to about 200 meters of punch tape); we handle length or radius corrections for 100 tools; 100 parameters can be stored for parametric programming; eight independent null points can be given with six coordinates each; we can describe the characteristics of the machine tool on 400 bytes; and we carry out correction of mechanical errors on the basis of a 1,000 byte data table.

All of the 70 K bytes of data listed can be edited, can be entered manually, from punch tape or via a DNC channel and can be sent to a picture screen, punch tape or the DNC machine tool.

Several services facilitate the preparation of programs:

--parametric programming,
--a possibility for arithmetic operations among parameters,
--subroutine management (the CNC is capable of storing 64 subroutines

simultaneously and a single call sentence can request any number of repetitions),
--parametric subroutine programming,
--conditional and unconditional jumps,
--decimal point handling.

Operating the equipment and loading or running the program are simplified by the picture screen built into the CNC; on it one can continuously follow all essential data characterizing the momentary state of the program and machine.

Reliability, Tests and Diagnostics

Reliability is one of the most important parameters of automatic industrial systems. In the course of designing and developing the UNIMERIC CNC we tried to keep this in mind in every phase of the work.

A carefully selected assortment of parts and a demanding manufacturing technology are indispensable conditions for reliability.

It is also a condition for reliability that the failures of the system are recognized in time, when catastrophic consequences can be avoided. Our test system serves this purpose.

In the course of designing the software and hardware we developed our system in such a way that every element of the system adequately provided conditions for testing and diagnostics. In the course of designing our programs we did not strive to prepare independent tests--although naturally we also use such tests--but rather we strove to see that testing was an organic part of the functional procedures. Naturally we also provided the necessary hardware tools for this.

We list here only a few examples of how we tried to increase the reliability of the equipment:

--A complete equipment test runs after it is turned on and the CNC will not "start" if a failure is noted during the test.

--Every RAM area is protected by a parity bit and the CNC executes an "emergency shutdown" in the event of a parity error.

--The functional modules watch "their own tools," for example whether there is a feed voltage, that there is not a line break, whether the central unit has served them in the meantime.

--The central unit tests the more important functions in background, for example the program stores (EPROM) and the data stores (RAM).

--The control cycles constantly watch the momentary position of the machine and if the machine is not in the calculated position and if the deviation exceeds the permissible value on the basis of the momentary speed then movement is prohibited.

--For every data input the equipment checks the parity correctness of the data.

--Sentences read in are checked syntactically and semantically.

We have listed only a few of our tests but perhaps they well illustrate our conception, that the function should carry its own check itself.

If the system discovers a failure then it tries to find the cause and the result of the investigation appears on the display.

Processing Three Dimensional Surfaces and Along Complex Lines

The development of designs, designing methods and technology make necessary the manufacture of ever more complicated parts. In the interest of solving the tasks on machine tools more and more moving axes are needed and the number of simultaneous movements is increasing as well. Turning movements have become necessary along with movements executed along the straight.

In Figure 3 one can see that the tool must move along three axes simultaneously to work along the plane line--for example, the control path--and one of these performs a turning movement. In this case, for example, the task of the CNC is to control the "three-dimensional" movement created by the X-Y-C axes.

The task becomes even more complicated in the case of a surface as depicted in figures 4 and 5. With three axis movement--Figure 4--the result of the working cannot be a continuous surface. This can be produced with the method depicted in Figure 5 if the system created by the machine and the CNC is capable of moving axes 5 and 6 simultaneously. In Figure 6 we show the position of the tool at various points of the path.

The coordinated work of a number of developmental areas is needed to work three-dimensional surfaces and paths. One task falls on the machine tool manufacturers; in addition to the main axes the tool must be moved along a constantly turning axis. The other task is the development of a CNC which is capable of controlling such movements on a programmed path.

At the 1985 Budapest International Fair the Esztergom Milling Machine Factory of the Machine Tool Industry Works and VILATI jointly displayed the results achieved thus far. The processing center exhibited was equipped with a tilting table and turnable axis main spindle along with the customary X-Y-Z axes. The UNIMERIC CNC is capable of simultaneous control of six axes and it offers an input language which makes the working of three-dimensional surfaces programmable by the user.

Describing the geometries and technologies of three-dimensional surfaces is an extraordinarily complex task which in the great majority of cases is possible only with computerized methods. The development of these methods is taking place in our country in three places--at the Machine Manufacturing Technology Faculty of the Budapest Technical University, at the SZIMEM [Esztergom Milling Machine Factory of the Machine Tool Industry Works] and at the MTA SZTAKI

[Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences]. The programming of the surfaces is done by breaking the path down into elementary sections--primarily straight ones. The precision of the surface desired determines the "fineness" of the breakdown. In essence the CNC performs a "six dimensional straight interpolation" between the starting point and the end point.

In the course of the interpolation the CNC treats the tool as a three-dimensional vector, as seen in Figure 6. Knowing the dimensions of the tool the CNC computes the components of the three-dimensional radius and length correction. It performs this computation knowing the direction of the vector, which must be contained by the parts program, that is, along the path the physical tool is always in contact with different points, and the programmer determines each point by programming the direction of the vector.

In order to produce a surface of acceptable quality the dimensions of the elementary sections are sometimes very small; sometimes one must separate elements shorter than 1 mm. It follows from this, on the one hand, that the CNC must process the program sentences extraordinarily quickly and, on the other hand, that the length of the parts program increases.

In the case of a complex workpiece a program of several hundred K bytes may be needed. We are not planning to build stores of this size into the CNC because we think that a DNC system must be used for manufacture of this type.

The CNC In A Manufacturing System

Today the needs of our users already make necessary the development of networks consisting of several computers (let us only mention that in the internal construction of the CNC also we have shifted to a multiprocessor system).

We store the parts programs needed for three-dimensional processing in a large capacity background memory. We entrust the management of this to a separate microcomputer. We offer the UNIPROG equipment manufactured by VILATI for this purpose. We have developed a DNC link between the UNIPROG and the UNIMERIC CNC through which parts programs, tool correction data, parameters and null points can be sent in both directions, that is all the data which may be needed for the processing.

Data transmission takes place through a high speed V. 24 channel, thus all the stores of the CNC can be loaded in 1-2 minutes. This same operation through a built-in punch tape reader could take 30-50 minutes.

This year there will be a version of our DNC system which is capable of continually receiving new data from the computer during shaping, thus the length of the parts program can be as long as one likes. According to our plans the UNIPROG will store the program in a high level language, continually translate it for the CNC, and hand it on at the rate required by the processing. Depending on the needs for data transmission the UNIPROG can serve several CNC devices simultaneously.

Several CNC's or similiar devices must be linked together in a manufacturing cell. Closer cooperation than in a DNC system is needed within each cell if we are to realize synchronized operation of the machines. We intend to use a separate supervisory microcomputer for this task. This will continually receive from all devices the data pertaining to their momentary state and will intervene in the operation of the system according to its own program.

One can see in Figure 7 a block diagram of our system. We have illustrated here those devices which are being manufactured today or are under development. All our equipment is built on uniform hardware bases; the central unit, the memories and the peripheral interface elements are made from the same module elements, which significantly simplifies manufacture of the entire system and service problems for it.

Supervisory Systems

Supervision is a basic requirement for manufacturing systems. This means a comprehensive control system which constantly watches the machine, the workpiece, the tools and the auxiliary equipment and automatically intervenes or shuts down in the event of malfunctions.

The complexity of the task requires that we work jointly with all those institutions the experts of which have already acquired experience in this area. The SZIM, the Machine Manufacturing Technology Faculty of the Budapest Technical University, the Machine Tools Faculty of the Heavy Industry Technical University in Miskolc and the MTA SZTAKI are centers for this work.

VILATI intends to contribute to a solution with more and more new services by the UNIMERIC CNC.

In the interest of this we have built a measurement possibility into the CNC. With the aid of a measurement tool it is possible to check the position and base of the workpiece taken up and the finished dimensions at the end of processing. If a suitable measurement tool is installed it is also possible to check the tool.

In a joint development with SZTAKI a CNC service system is being prepared which is also capable of checking the dimensions of milling tools at each grasp. We are planning to realize a few ACC functions; at present these are research themes for the laboratories of SZTAKI and the universities.

High Level Programming Languages

Programming the CNC with manual methods is extraordinarily burdensome, and in the case of complex workpieces and especially of three-dimensional surfaces it represents an impossible task. We intend to aid the task of preparing programs with the UNIPROG NC program development system.

UNIPROG is a universal computer built from elements of our system which is suitable for running the traditional FORTRAN, BASIC, etc. languages and high level languages aiding NC programming. The GTI [Machine Industry Technological Institute] and the SPE have developed the GTIPROG and SPEAPT languages which

facilitate the description of the geometry and contain the necessary postprocessors which produce the input data needed for the CNC.

The UNIFAX, developed jointly with the SZIMEM, and the FAUN program system designed at the Machine Manufacturing Technology Faculty of the Budapest Technical University aid the programming of multi-axis processing.

FIGURE CAPTIONS

1. p 286. Block diagram of the system.

2. p 287. Elements of the control cycle and a simplified model.

   Key:
   1. computed path element
   2. drive
   3. moving axis
   4. measuring element
   5. the control cycle
   6. prescribed position
   7. position deviation
   8. prescribed speed
   9. actual speed
   10. actual position

3. p 289. To work the control path the tool must be moved along three axes, one of which is rotating.

4. p 289. A continuous surface cannot be made with three axis tool movement.

5. p 289. A continuous surface can be made in the event of simultaneous movement of 5-6 axes.

6. p 289. Position of the tool when working a three-dimensional surface, at various points of the path.

7. p 290. Block diagram of the expanded control system. [The UNICELL is also labled "supervisory control."]

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PROGRAMMABLE LOGIC CONTROL EQUIPMENT FROM VILATI

Budapest GEP in Hungarian No 8, Aug 85 pp 291-293

[Article by Istvan Aitner, of VILATI: "The PLC Family of VILATI"]

[Text] The Electric Automation Prime Contracting and Manufacturing Enterprise used PLC equipment for the first time in 1977 to carry out control and display tasks for the water treatment plant of the Borsod Chemical Combine. Experts from VILATI [formerly the Electric Automation Institute--presumably reorganized into an enterprise with the above name] and the ELAN firm in the FRG jointly solved the task with the P4000 type PLC equipment of the West German firm. On the basis of the favorable experiences--short installation time, simple and swift changes while putting it into operation--the leadership of the enterprise decided that in the future it would like to appear on the market with control equipment of its own manufacture. In 1979 a joint development cooperation began between the Heavy Chemical Industry Research Institute and VILATI as a result of which the PROLOCON-D1 control equipment was developed.

Characteristic Data

The control equipment consists of a central unit and a digital peripheral system linking it to the technology.

The Central Unit

The central unit uses an Intel 8085 microprocessor.

It contains the monitor program needed to develop and run the user program and provides 24 K bytes memory capacity for the user program.

Peripherals which can be connected:

--display,
--printer,
--cassette tape recorder,
--programming device.

The Digital Peripheral System

The digital peripheral system provides a link between the devices of the technology and the central unit of the PLC equipment.

Input Channels

A single card has 32 channels. Optical isolation and RC section filtering provide interference protection for the channels. The input circuit loads the signal transmitter contact with a 12 mA current at 24 V direct current. A light emitting diode on the forward part of the card indicates the logical state of the channels.

Output Channels

The output cards are also 32 channel cards and optical isolation provides their interference protection. The channels can be loaded with a 200 mA current at 24 V direct current. In the case of high power output channels the loading capacity is 1 A at 24 V direct current.

Special Cards

Sound Signal Card. With the aid of this the designer can list the technology signals to any of three types of sound signals by means of programming. The various signal levels have priority in regard to each other. A 10 VA 5 ohm loudspeaker can be connected to the output of the card.

Test Card. Using the card makes it possible for the programmer to display an optional group of internal variables (32 internal variables) during program testing.

Power Supply

Two independent 24 V direct current power units are needed to operate the equipment. The first, a 24/5 V power unit supplying the TTL voltage for the PLC equipment, provides power which is ground independent from the viewpoint of interference protection. The second power unit supplies the currents of the I/O channels connecting to the technology. The negative pole of the peripheral power unit is grounded at one point.

Construction and Environmental Parameters

The PROLOCON D1 equipment is built up of standard units which makes possible modular construction and simple design, manufacture and later expansion of the equipment. The logic cards used in the equipment are double ESZR [uniform computer technology system] size (150 x 320 mm) with 2 x 48 pole direct gilded terminals. The output and input cards are location independent.

The cards are placed in a drawer. A printed circuit base sheet serves to connect the card terminals (address bus, data bus, control signals).

The basic drawer can contain 18 I/O cards (576 channels) in addition to the central unit and power unit cards.

An expansion drawer permits building in of an additional 27 I/O cards (864 channels).

Electronics Cabinet

The PLC equipment and the 24 V direct current power units needed to operate the equipment are built into a cabinet. Built-in fans take care of removing the heat dissipated in the equipment. The multi-circuit switches built into the lower part of the cabinet have a dual task. On the one hand they provide a link for the peripheral channels toward the technology; on the other hand they make possible a regulated link between the I/O channels and the technology, between the multi-circuit switches and the card terminals of the electronics drawer.

Programming Device

The programming device consists of 16 seven segment indicators and 2 x 16 Hall generator pushbuttons.

The indicator makes possible a display of the functions written in. One keyboard field serves to enter instructions and addresses, the other to enter logical operators and auxiliary operators. The device is linked to the central unit of the PLC equipment via a 40 conductor tape cable. With the aid of the device the logical functions can be written into the RAM memory of the central unit. The program written in can be run, corrected and burned into the EPROM memory, and written out of memory.

The hardware testing of the I/O channels of the equipment can be performed with the programming device.

Program Language of the Equipment

The PROLOCON-D1 control equipment works under the supervision of the TRANSIT-85 program language. The programming can be done with functions which can be described with the rules of Boolean algebra.

The language is built up of instructions which aid the simple programming of the equipment, not presuming knowledge of computer technology. When using the language we use an identifier of the equation--which is also the address of the current output channel--instead of a complex operation of internal memory addresses.

This represents a great advantage when programming because it is necessary to use only one sort of addressing, the output addresses of the functions describing the control algorithm.

The TRANSIT-85 program language works with operands, logical operators and auxiliary operators.

The left side of the expression contains the address of the output channel to be operated--and the definition of the associated delay if any--while the right side contains the logical function defined between the current inputs.

Only one equation can belong to one output address.

The operands are collections of the input and output and internal variables of the system such that the control task can be described by creating various logical connections between them:

--the address range of the input variables is 0000-2048,
--the address range of the internal variables is 4096-6143,
--the address range of the output variables is 6144-8191.

Logical Operators

--AND is the logical and connection,
--OR is the logical or connection,
--XOR is the logical exclusive or connection,
--NOT is logical negation.

Auxiliary Operators

--open paren,
--close paren,
--pulse shift, shift with identical time,
--pulse formation,
--operation delay,
--drop delay,
--pulse division,
--flip-flop operation,
--stepping register operation.

When programming the time base is one second with one press of the auxiliary operator and one minute with a double press.

The operands and parameters are four character decimal numbers.

The range of the parameters can extend from 1 to 999.

The operands and operators take 2 bytes in memory, the operation signals take one byte.

The Instruction Set

CLEAR--erase table,
FETTLE--equation collect in address sequence,
ASSIGN--equation execute for given group,
BRING--equation transfer,
PROG--equation burn-in,
RUN--equation execute for entire system,
SEE--equation examination,

TYPE--equation display,
JOIN--equation carry-in,
LEVEL--I/O channel test,
EXECUT--equation execute for already implemented function.

Operation of Equipment

During operation the PLC equipment first solves every stored logical function according to the current value of the input channels and puts the logical value of these into the output table.

Then the equipment examines the inputs in sequence and solves only those equations for which the logical value of the input figuring in the equation has changed compared to the preceding query cycle.

In this way a relatively high reaction speed can be obtained, limited only by the time to query the inputs and the length of the equations to be solved in the course of the query cycle.

Development of the user program takes place with the aid of the program development card (RAM/EPROM).

An already tested program is burned into the EPROM memory and can be run with the aid of the program storage card (EPROM).

The PROLOCON-D2 PLC Equipment

On the basis of experiences acquired with use of the PROLOCON-D1 equipment a need arose to develop PLC equipment suitable for controlling smaller technologies.

Taking economicalness factors into consideration the PROLOCON-D2 equipment does not contain the hardware and software needed to develop the user program, this being put into a separate programming device. In the event of using a number of PLC devices it is enough to buy one developmental system.

The PLC equipment is suitable only for running an already written and tested program burned into EPROM memory.

Technical Data

Central unit:

--microprocessor used, Intel 8085,
--user memory capacity, 24 K bytes,
--peripherals which can be connected, a display.

Peripheral System

Digital Input Channels. The card is a 16 channel card, interference protection is provided by optical isolation and RC section filtering. The input circuit loads the signal transmitter contact with a current of 12 mA at 24 V direct current.

Analog Input Channels. The card is an 8 channel card (the maximum number of channels which can be used is 31) with an input signal range of 4-20 mA or 0-20 mA.

Digital Output Channels. The card is a 16 channel card; optical isolation provides interference protection. The channel can be loaded with 150 mA current at 24 V direct current.

Digital Heavy Current Output Card. The card is an 8 channel card; optical isolation provides interference protection; the channel loadability is 1 A at 24 V direct current.

Reed Relay Output Channel. The card is an 8 channel card; light emitting diodes on the front of the card indicate the logical state of the channels. The dimensions of the cards are 150 x 140 mm (ESZR). The cards are connected by 48 pole direct terminals. The cards are located in a 27 slot rack drawer.

Power: 24 V direct current + 10% - 15%. The TTL circuits are 5 V circuits and the equipment contains the +/- 15 V power units needed to operate the analog channels.

Programming Device

This is a portable (briefcase) microcomputer capable of independent operation as well with the aid of which user programs can be developed. Power comes directly from the 220 V grid. The programming device uses an Intel 8085 microprocessor.

The device has a 2 x 16 element keyboard and a 16 character display provides information about its operation. Display, line printer and cassette tape recorder connections and a socket for burning EPROM memories are located on the front panel.

Fifty K bytes of RAM are available to the user. Connected to the PROLOCON-D2 equipment the programming device makes possible testing of the I/O channels and the user program.

The operation and the program language of the equipment are the same as described for the PROLOCON-D1 equipment.

PROLOCON-D3 PLC Equipment

A PROLOCON-D3 MINI PLC has been developed based on the needs of users. The MINI PLC, like the PROLOCON D-2 PLC, is suitable only for running user programs already written and burned into EPROM memory (not for program

development). Developing and archiving the user program, hardware testing of the PLC equipment and testing of the user program can be done with the program development briefcase of the PROLOCON-D2 equipment.

Technical Data

Central unit:

--microprocessor used, Intel 8085,
--memory area for user program, 4 K bytes,
--display link for restoring and testing, 24 V direct current, peripheral unit,
--number of input channels, 24,
--galvanic isolation and RC section filtering,
--LED display of logical state of channels,
--the input circuit of the channel loads the signal transmitting contact with 12 mA current at 24 V direct current.

Number of output channels, 24:

--galvanic isolation,
--LED display of logical state of channels,
--load of channels 150 mA at 24 V direct current.

The 220 V peripheral unit:

--number of input channels, 16,
--display of logical state of channels,
--external operating power for input channels, 220 V alternating current,
--number of output channels, 16,
--channel output is a potential-free closing contact,
--output channel can be loaded with 3 A at 220 V alternating current.

Power supply: The PLC is powered by 220 V alternating current. The equipment contains the 220/5 V direct current power unit needed to operate the TTL circuits.

Connection: Multi-circuit switches built into the equipment provide connection for the I/O channels and power supply. Operation of the equipment and its program language are the same as described for the PROLOCON-D1 equipment.

With the described members of the PROLOCON family VILATI offers the user the opportunity to use optimal equipment for the control tasks to be solved at the most suitable price. The task can be solved in combination with machines of different sizes.

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LOCAL COMPUTER NETWORKS AT SCIENTIFIC, INDUSTRIAL FACILITIES

Budapest MAGYAR TUDOMANY in Hungarian No 10, 1985 pp 749-753

[Article by Ference Telbisz, scientific department head at Central Physics Research Institute]

[Excerpt] Local Networks in Hungary

In a rather natural way this new and promising developmental trend was very soon noted in Hungary also and they set about developing local networks in a number of places. In Table 3 we have listed in alphabetical order--together with their chief characteristics--all those developments the author knows of. We will briefly describe with a few words the systems figuring in the table.

Table 3

Developmental Institute	Name of Local Network	Structure	Access Method	Speed
ATOMKI	LANDEX	bus	CSMA/CD	1 M bit/s
BME-MMT	HNS	bus	CSMA/CD	125 K bit/s
KFKI	LOCHNESS	bus	CSMA/CD	1 M bit/s
SZKI	PROP-NET	ring	"token"	500 K bit/s
SZTAKI	COBUS	bus	CSMA/CD	1.2 M bit/s
Videoton	EXLOC	bus	CSMA/CD	10 M bit/s

The purpose of the LANDEX system being developed at ATOMKI [Nuclear Research Institute] (Debrecen) is to distribute resources among the meaurement control microcomputers and the minicomputers doing the processing at the Cyclotron Laboratory.

The MMT [Instrumentation and Metrology Faculty] system developed at the BME [Budapest Technical University] MMT on commission for the Medicor Works is a system with a hierarchic structure serving primarily industrial and laboratory measurement data collection purposes.

The PROP-NET system developed by the SZKI [Computer Technology Coordination Institute] connects Proper-16 personal computers and its primary applications

areas are office administration or health affairs applications (including laboratory data collection).

Research and development connected with local networks began in our country first at the SZTAKI [Computer Technology and Automation Research Institute]. The purpose of the COBUS local network they developed is to make possible the creation of large applications systems, primarily office and planning systems.

The EXLOC system developed by Videoton is intended to offer an Ethernet compatible network link between the R11 computers manufactured and sold by them and 16 bit microcomputers. The applications areas are office automation, designing and computer development systems.

Since the author participated in the local network developments of the KFKI [Central Physics Research Institute] we will describe this system in more detail below as an example.

The LOCHNESS System

We began to deal with local networks at the KFKI in 1979. We regarded laboratory measurement data collection and process control as the primary applications areas and tried to develop the architecture and parameters of the network in such a way as to be optimal primarily for such purposes but also so as not to exclude applications with other purposes.

In general process control systems are hierarchical systems working with distributed resources which usually consist of a number of subsystems. Each subsystem is controlled by a minicomputer and each subsystem has some special control or data collection task. The control computer is also a subsystem and its primary task is to provide the man-machine link needed to control the entire system; in this case we call it the system control computer. We use TPA-1140, 1148 or 11/440 computers as the minicomputers.

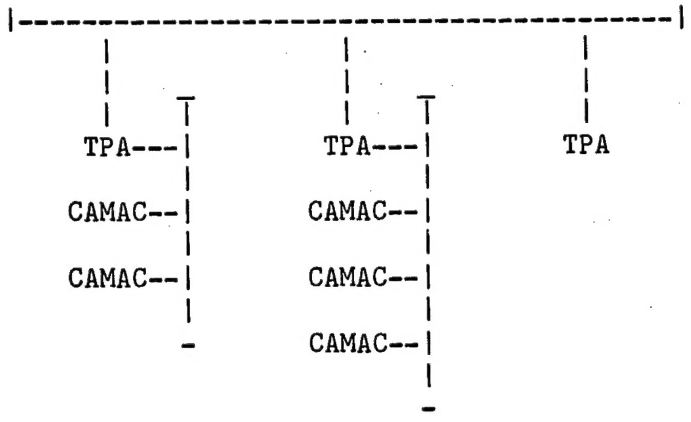
Special so-called "real-time" peripherals link the computers to the "external world," to the laboratory or industrial processes. These transform the various signals into a form which the computer can "understand" or regulate the operation of the equipment by means of control signals given by the computer. An internationally accepted CAMAC standard has been developed for such computer links. The CAMAC system consists of elements which can be plugged into frameworks; every framework is controlled by a frame control module. More recently the frame controls also contain a microprocessor; in this case we call them intelligent frame controls. Such intelligent CAMAC frame controls can be connected to the local network developed by us and with their aid a complex CAMAC measurement and control system can be connected also.

Since it is customary to give names to systems we christened the developed system LOCHNESS, which comes from the English expressions characterizing the network (LOCal High speed NEtwork SyStem).

The data path of the local network is a coaxial cable, between the several subsystems and within the several subsystems. An example can be seen in Figure 5. This contains three subsystems; the first and second systems have two and

three intelligent CAMAC frame controls respectively while the third has none. Each subsystem uses a separate coaxial cable segment and the several subsystems are connected together by a common coaxial cable segment. The length of each coaxial cable segment is a maximum of one kilometer. The data transmission speed is one M bit per second and the coaxial cable is isolated from the several computers to a voltage difference of 15 kV. This latter is needed because of laboratory conditions since a high voltage could reach the individual CAMAC units.

Figure 5. A Hierarchic Local Network



We also use the CSMA/CD algorithm as access method, but in a slightly modified form. We deviate from the Ethernet "standard" in speed and in the solution of "collisions" and in the fact that we have introduced collateral rules. The first deviation was dictated essentially by the technology available when the development began while the other two deviations serve the goal of being able to adapt better to the requirements of the planned environment. We refer the reader interested in the technical details to publications in the professional literature; here we will summarize only the most important aspects.

In the LOCHNESS network it is possible to assign priorities to both stations and individual messages, making it possible for the more important or more urgent messages to reach their targets sooner. Since experimental equipment was involved we developed the local network coupler in such a way that with minor modification it would also be suitable for use of the "token passing" method. In this case, naturally, there can be neither station nor message priority. However, we regarded maximal utilization of line transmission capacity as a primary requirement, considering that in a measurement data collection environment it may be necessary to transmit very large volumes of data (2-3 M bytes) in a very short time (about 2-3 minutes). We will return later to a description of some measurement data pertaining to this.

Although in designing the network architecture we used the ideas and concepts of the ISO pertaining to the architecture of open systems, we deviated from them in every case where we judged this useful from the viewpoint of either efficiency or implementation. DECNET, the network system of the Digital Equipment Corporation (USA), is a widely used network system and it can be used on the PDP-11 computers of the firm. Since the TPA-11 computers and their

operating systems are in harmony with the operating system of these computers we decided that the services offered to the user by the LOCHNESS system and the method of making use of them should be completely identical with the services of DECNET. (Footnote: DECNET is a registered trademark of the Digital Equipment Corporation.) (Of course, the software offering the services differs entirely from the DECNET software, for efficiency reasons.) This has the advantage that any application developed in a DECNET environment can be transferred to the LOCHNESS environment without further ado and vice versa. The difference can be noted only in the speed and response time, as we ourselves experienced in several examples.

The auxiliary programs are essential parts of any network system; by using these the users can transmit data through the system withount any programming effort. The following auxiliary programs are available in the LOCHNESS network:

--By using the file transfer auxiliary program data files can be moved between any two machines linked to the network. Data transfer can be initiated from a third machine too.

--By using the remote terminal auxiliary program any terminal can be linked logically to a remote computer and can be used as if it were a terminal of the remote computer.

--With the aid of the terminal dialog auxiliary program messages can be sent between the terminals of any two minicomputers linked to the network, or conversation can be conducted.

--There is also a program package with the aid of which the peripheral equipment (magnetic disk, magnetic tape or line printer) of a distant computer can be used in exactly the same way as local equipment, as if the network did not intervene.

Such or similar services are generally available to users in network systems. An additional very important and perhaps most interesting applications package is the Distributed Process Control Database (PCDB) management system. In general databases describe a relatively static system such as the stock of a library, the accounts system of a bank or the personnel records system of an enterprise, and the data are placed in the background store of the computer. A good part of the data of a process control database reflects the momentary state of a system which may be rapidly changing (for example, an oil pipeline system) and a larger part of the data can be found in the operating memory of a computer or in some of the equipment of the measurement system. With the aid of the database management system prepared for the LOCHNESS network the user can access in exactly the same way data in the operating memory or magnetic disk background store of the local or any distant computer or in the operating memory of a remote intelligent CAMAC frame control.

We did several measurements pertaining to the performance capacity of the network. According to our measurements data can be transmitted between the memories of two machines at a speed of 80 K bytes per second, which represents 65 percent utilization of the theoretical line capacity. The limiting factor

is the processor of the machines, which is also indicated by the fact that according to data in the literature the speed which can be achieved between two machines on an Ethernet cable, which has 10 times the capacity, is of the same order of magnitude.

Since the services offered to the user are identical with the services of DECNET, analog measurement data can be collected easily with our measurement programs. It has been shown that in a DECNET environment, in the case of a point-to-point link of the same speed (1 M bit/s), one can achieve a transmission speed of about half ours. We attribute this to our software system which was specially optimized for the local network environment.

We will provide a more detailed account of measurement data at professional forums.

The LOCHNESS network is essentially completed for the TPA-11 series machines; at present, by creating more and more applications systems, we are striving to acquire the system building experience needed for further progress.

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END